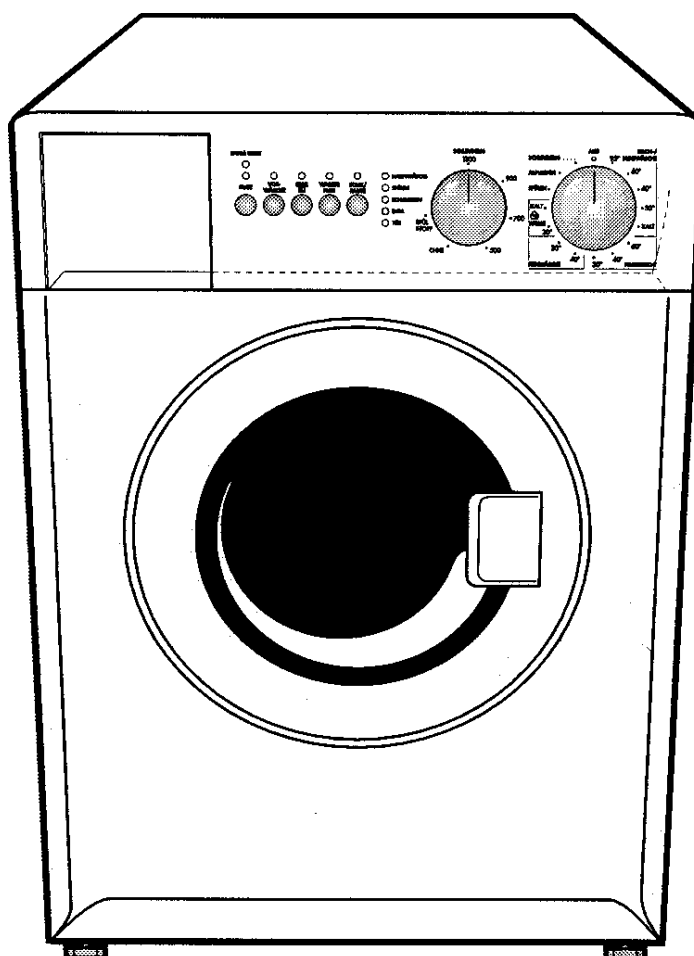


**Compact front loaded  
Washing Machines  
with EWM 1000**



© Electrolux  
Muggenhofer Straße 135  
D-90429 Nürnberg  
Germany

Publ.-Nr.:  
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**Compact front loaded  
Washing Mashines  
from Torsvik**

**with  
EWM 1000**

Fax +49 (0)911 323 1022

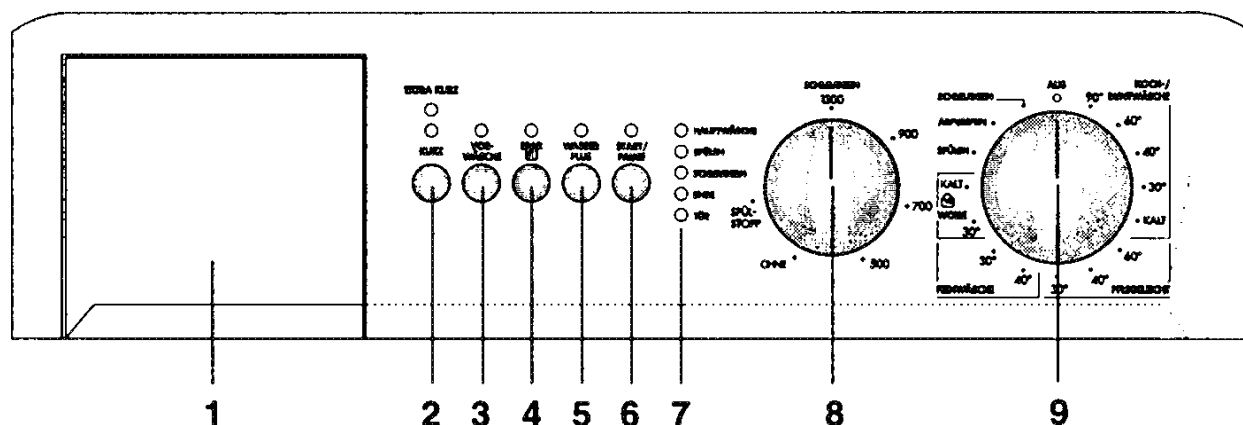
Spares Operation

Ausgabe: 11.2003  
DGS-TDS-N - R.Kurzke

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## Panel



- |   |                                |   |                          |
|---|--------------------------------|---|--------------------------|
| 1 | Drawer                         | 6 | Push button „start/hold“ |
| 2 | Push button „short/very short“ | 7 | Program cycle LEDs       |
| 3 | Push button „prewash“          | 8 | Switch spin speed        |
| 4 | Push button ECO                | 9 | Program selector         |
| 5 | Push button „additional rinse“ |   |                          |

Fassungsvermögen	3 kg
Gesamtanschlußwert	1700 W
Heizung	1400 W
Laugenpumpe	30 W
Hauptmotor	Waschen 200 W
	Schleudern 300W
Schleuderdrehzahl	max. 1300 U min
Spannung	220-230 V/50 Hz
Absicherung	10 A

Wasserdruck:	min	10 N/cm <sup>2</sup>
	max	100 N/cm <sup>2</sup>
Gesamthöhe		67cm
Gesamtbreite		49,5 cm
Gesamttiefe		52cm
Gesamtgewicht		54 kg
Energieeffizienz		A

## Program cycles / Consumptions

Detergent		Program cycle				Consumption		
Main wash	Softener etc.	Main wash	Rinses	Normal spin and drain	reduced spin speed and drain	Current (kWh)	Water (Liter)	Time (Min.)
x	if required	x	x	X		1,43	47	126
x		x	x	X		0,93	39	146
x		x	x	X		0,57	39	131
x		x	x	x		0,78	44	107
x		x	x		X	0,57	42	82
x		x	x		X	0,38	42	61
x		x	x		X	0,21	44	46

## Program Options

The table below lists the possible options for the washing programmes, the compatibility of the various options and with the cycle, and when it is possible to select or modify the options.

The options can be selected in different ways:

- using the programme selector: in this case, the options are configured as special programmes.
- using the pushbuttons

			OPTIONS											
			Rinse-hold	Night cycle	Pre-wash	Stains	Short (Daily)	Very short	Economy	Super-rinse	Bleach	Half-load	Easy-iron	Reduced spin speed
Compatibility with PROGRAMMES	Cotton	90°C	x	x	x	x	x	x	x	x	x	x	x	x
		60°C	x	x	x	x	x	x	x	x	x	x	x	x
		50°C	x	x	x	x	x	x	x	x	x	x	x	x
		40°C	x	x	x	x	x	x	x	x	x	x	x	x
		30°C	x	x	x		x	x		x	x	x	x	x
		cold	x	x	x		x	x		x	x	x	x	x
	Synthetic fabrics	60°C	x	x	x	x	x	x	x	x			x	x
		50°C	x	x	x	x	x	x	x	x			x	x
		40°C	x	x	x	x	x	x		x			x	x
		30°C	x	x	x		x	x		x			x	x
		cold	x	x	x		x	x		x			x	x
	Delicates	40°C	x	x	x			x		x				x
		30°C	x	x	x			x		x				x
		cold	x	x	x			x		x				x
	Wool / Hand washing	40°C	x	x										x
		30°C	x	x										x
		cold	x	x										x
	Soak													x
	Rinses		x	x						x	x	x		x
	Delicate rinses		x	x						x				x
	Conditioner		x	x										x
	Drain													
	Spin													x
	Delicate spin													x
Compatibility with OPTIONS	Rinse-Hold				x	x	x	x	x	x	x	x	x	
	Night-time cycle				x	x	x	x	x	x	x	x	x	
	Pre-wash		x	x			x	x	x	x		x	x	x
	Stains		x	x			x	x	x	x		x	x	x
	Very short		x	x	x	x				x	x	x	x	x
	Short (Daily)		x	x	x	x				x	x	x	x	x
	Economy		x	x	x	x				x	x	x	x	x
	Super rinse		x	x	x	x	x	x	x		x	x	x	x
	Bleach		x	x			x	x	x	x		x	x	x
	Half-load		x	x	x	x	x	x	x	x	x		x	x
	Easy-iron		x	x	x	x	x	x	x	x	x	x		x
	Reduced spin speed				x	x	x	x	x	x	x	x	x	
Phases in which selection or modification are possible	Selection		x	x	x	x	x	x	x	x	x	x	x	x
	Pre-wash		x	x		x	x	x	x	x	x	x	x	x
	Wash		x	x		x	x	x	x	x	x	x	x	x
	Rinses		x							x	x	x	x	x
	Spin												x	x

## GENERAL CHARACTERISTICS

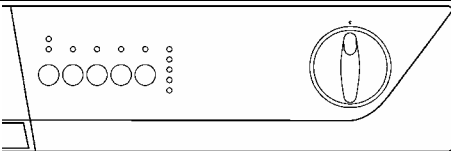
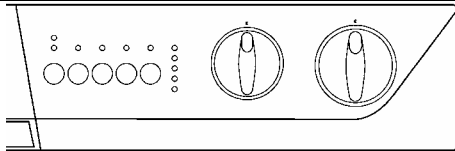

The EWM 1000 electronic control system consists of a single PCB, which incorporates the power, control and display functions.

The PCB is contained in a protective casing located behind the control panel support. Two basic versions of the PCB are produced: one with horizontal pushbuttons and one with vertical pushbuttons.

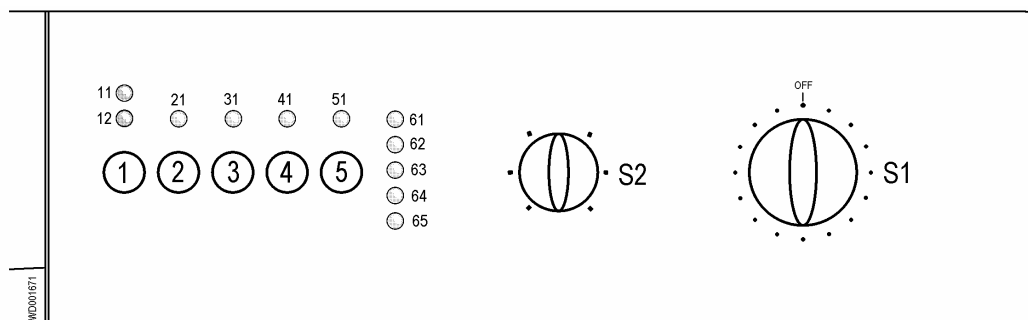


The EWM 1000 electronic control system may be fitted to the following appliances:

- |  |       |
|--|-------|
| ◆ front-loading washing machines manufactured in Spain (Alcalà de Henares) | (ESA) |
| ◆ front-loading washing machines manufactured in Germany (Nürnberg)        | (DGN) |
| ◆ top-loading washing machines manufactured in France (Revin)              | (FFH) |
| ◆ front-loading washing machines manufactured in Italy (Porcia)            | (ZP)  |

<b>Versions with horizontal pushbuttons</b>		
<b>Version with vertical pushbuttons</b>		
<b>Number of buttons</b>	▪ max. 5 (4 options + start/pause)	
<b>Number of LEDs</b>	▪ max. 11 for version with horizontal pushbuttons ▪ max. 15 for version with vertical pushbuttons	
<b>Programme selector</b>	▪ 16 positions with main switch (incorporated in the PCB)	
<b>Secondary selector</b>	▪ 6 positions for horizontal version only (incorporated in the PCB)	
<b>Buzzer</b>	▪ incorporated in the PCB	
<b>Serial port</b>	▪ DAAS-EAP communications protocol up to 38400 baud	
<b>Power supply</b>	▪ 220/240V ▪ 50/60 Hz (configurable)	
<b>Type of washing</b>	▪ traditional ▪ with "eco-ball" sphere	
<b>Rinsing system</b>	▪ Traditional	
<b>Motor</b>	▪ Commutator motor	
<b>Spin speed</b>	▪ 600 - 1400 rpm	
<b>Anti-unbalancing system</b>	▪ FUCS	
<b>Water fill</b>	▪ 1 solenoid valve with 1 inlet - 2 outlets	
<b>Detergent drawer</b>	▪ 3 compartments: prewash/stains, wash, conditioners ▪ 4 compartments: prewash/stains, wash, conditioners, bleach	
<b>Control of water level in the tub</b>	▪ two-level pressure switch: 1st level and anti-boiling safety level (the other levels refer to fixed-time fills) ▪ possibility of three-level pressure switch: 1st level, anti-boiling and anti-flooding safety levels	
<b>Door safety device</b>	▪ Traditional (with PTC) ▪ Instantaneous	
<b>Power of heating element</b>	▪ up to 1950W	
<b>Temperature control</b>	▪ NTC sensor	

## Configuration of control panel



The washing programmes, the functions of the selector knob and the various pushbuttons vary according to the model, since these are determined by the configuration of the appliance.

### Programme selector (S1)

The selector features 16 positions and incorporates the ON/OFF switch. The various positions of the selector may be configured to perform different washing programmes; in the first position, the appliance is switched off and the current programme is cancelled. For each programme, the compatible options and other parameters are defined.



#### • Programme configuration

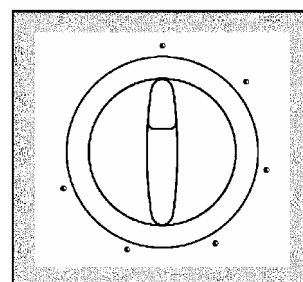
The table below lists the parameters that can be used to define the washing programmes.

<b>Types of fabric</b>	Cotton/linen, Synthetic fabrics, Delicates, Wool, Hand-wash
<b>Special programmes</b>	Soak, Rinses, Spin, Drain, Conditioner
<b>Temperature</b>	Normal, Maximum: the initial temperature is the maximum that can be selected for a specific washing programme
<b>Spin</b>	Normal, Minimum, Maximum
<b>Options (Normal / Possible)</b>	Bleach, Economy (energy label), Stains, Short, Very short, Reduced spin speed, Night-time cycle, Half-load, Easy-Iron, Rinse Hold, Extra rinse, Pre-wash
<b>Programme phases</b>	Pre-wash, Wash, Rinses, Spin, Economy, Delayed start

### Secondary selector (S2)

Certain models may also feature a 6-position secondary selector. The function of this selector is defined during configuration of the appliance

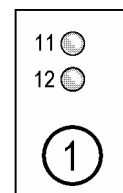
- **Temperature selector:** each position corresponds to a temperature or to the cold wash cycle.
- **Spin speed selector:** at each position, it is possible to select a spin speed that is compatible with the programme. In the final positions, the following options can also be configured: **No Spin**, **Rinse Hold**, **Night cycle**.



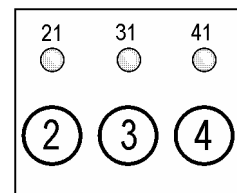
## Pushbuttons and LEDs

The functions of each button are defined by the configuration of the appliance.

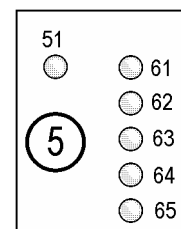
- **Button 1:** This pushbutton is connected to two LEDs (11 – 12) and, if used, may be configured for selection of one or two options; in the latter case, the two options cannot be selected at the same time.



- **Buttons 2, 3, 4:** These buttons are connected to LEDs 21, 31 and 41 respectively and, if used, each can be configured for a single option.



- **Button 5:** This button can be configured in two ways:  
 → **as a single option:** in this case, the button is connected to LED 51  
 → **as a multi-selection button:** in this case, the button is connected to LEDs 61, 62, 63, 64, 65, and can be used to select the spin speed and the delayed-start time. However, one of the LEDs must be configured as an END OF CYCLE signal; therefore not all the LEDs are used by this button.

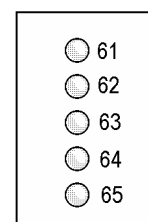


- **Combination of buttons:** The appliance can be configured to utilize a combination of two buttons (which must be pressed simultaneously for 5 seconds) to select the super-rinse cycle or to deactivate the buzzer (if featured). A similar procedure is used to access the diagnostics procedure or to select DEMO mode.

## Washphase LEDs

LEDs 61-65 can be used as wash phase indicators, in which case they are not associated with button 5.

These, too, can be configured; the END OF CYCLE indicator is featured on all models.



Indications	
<b>Pre-wash</b>	Lights during selection mode if the programme includes the pre-wash phase, and during the execution of the pre-wash
<b>Wash</b>	Lights during selection mode if the programme includes the wash phase, and during the execution of the wash
<b>Pre-wash/Wash</b>	Lights during selection mode if the programme includes the pre-wash or wash phases, and during the execution of these phases
<b>Rinses</b>	Lights during selection mode if the programme includes rinse phases, and during the execution of the rinses
<b>Spin</b>	Lights during selection mode if the programme includes the spin phase, and during the execution of the spin
<b>Drain</b>	Lights during selection mode if the programme includes the drain phase, and during the execution of the drain
<b>Extra rinse</b>	Lights when this option has been memorized (if included in the cycle)
<b>Rinse-hold</b>	Lights if the programme includes the rinse-hold option and at the end of the cycle, when the appliance stops with water in the tub
<b>Current cycle</b>	Lights during execution of the cycle
<b>End of cycle</b>	Lights when the programme has been completed; also used to display alarm conditions
<b>ON/OFF</b>	Lights when the appliance is switched on
<b>Door locked</b>	Lights when the door interlock prevents opening of the door, and switches off when the door can be opened. Flashes when the interlock is about to release the door (may be seen if PTC devices are used, as these require one or two minutes before releasing the interlock)

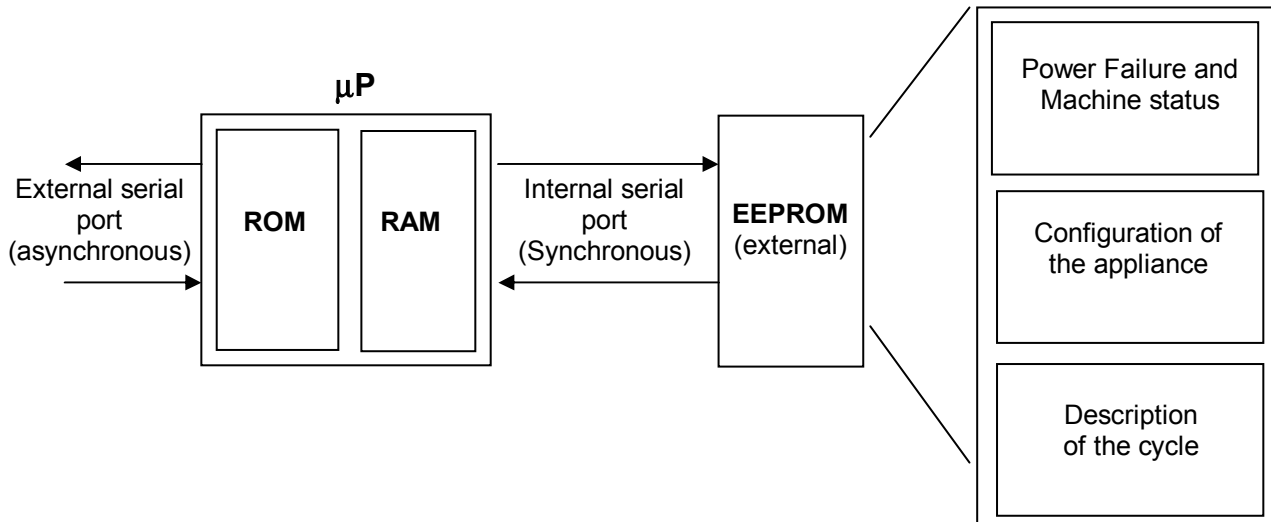
# TECHNICAL CHARACTERISTICS

## Control system memory



### General structure of the memory system

The system features an EEPROM memory module, fitted externally to the microprocessor, which serves to memorize the configuration data, the description of the cycle, the status of the appliance in the event of a power failure, and the alarms.



### ROM

The ROM (Read-Only Memory) contains the firmware code relative to the functions of the appliance:

- ⇒ Control of electrical loads (motor, pump, solenoid valves etc.).
- ⇒ Control of the sensors (pressure switches, motor speed, door status etc.).
- ⇒ Control of the user interface
- ⇒ Control of the serial port
- ⇒ Control of power failure procedure and alarms
- ⇒ Execution of the washing programme

In normal production appliances, the ROM cannot be modified.

### RAM

The RAM (Random-Access Memory) contains the variables, i.e. all the dynamic information used during execution of the programme:

- ⇒ Motor speed
- ⇒ Water temperature
- ⇒ Alarms
- ⇒ Cycle selected
- ⇒ Machine status

The RAM is cancelled when the power supply is disconnected (power failure or appliance switched off).

The contents of the RAM can be read using a computer connected via a DAAS interface.

The same system can be used to send commands to the electronic control unit such as:

- ⇒ Select remote control mode
- ⇒ Action the various loads in remote mode
- ⇒ Select diagnostics mode
- ⇒ Select a cycle and options, and start the cycle



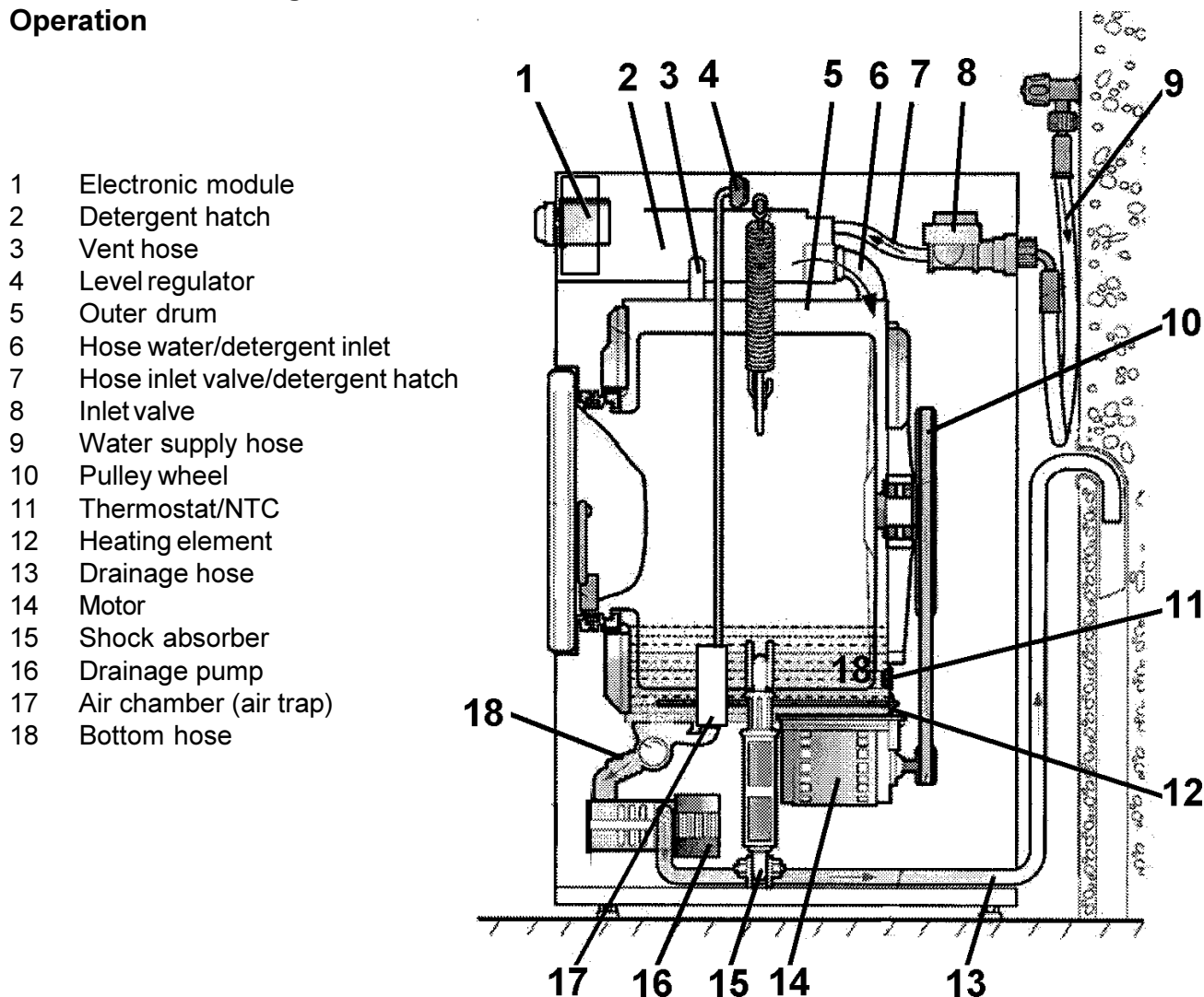
## EEPROM

The EEPROM contains data of various types:

- ⇒ Power failure, i.e. the information necessary to restart the appliance in the event of a power failure:
  - Selected cycle and options
  - Current phase and sub-phase
- ⇒ Machine status, used to perform special cycles such as:
  - Electrical test (used in the assembly line)
  - Continuous cycles (used in the factory workshop)
- ⇒ Machine configuration: the data contained in the EEPROM define the characteristics of the model and are interpreted by the function software. The variables are as follows
  - Type of appliance (front-loader, top-loader, compact)
  - Type of door interlock (PTC or instantaneous)
  - Anti-flooding safety device
  - Transmission ratio between drum pulley and motor pulley
  - Structure of the washing group
  - Power supply frequency (50/60 Hz)
  - Type of PCB (horizontal or vertical buttons)
  - Detergent drawer (3 or 4 compartments)
  - Final spin speed (600 – 1400 rpm)
- ⇒ Identification of the appliance:
  - Prod. N.
  - ELC
  - Serial number
- ⇒ Configuration of the user interface:
  - Programmes on main selector
  - Function of secondary selector (if featured)
  - Number and functions of buttons
  - Functions of the LEDs
  - Operation of the buzzer
- ⇒ Washing cycle tables: Each washing cycle consists of a series of phases (steps); the steps are the basic instructions which comprise the description of the cycle, which is common to all appliances having the same characteristics:
  - Water fill
  - Motor movement
  - Reset
  - Heating
  - Drain
  - Spin
  - "IF" conditions (options, temperatures etc.)
  - .....
- ⇒ Configuration of the washing cycle: for each family of appliances, certain parameters associated with the washing programme are defined:
  - Operational limits (voltage/frequency)
  - Transmission ratios
  - Parameters for control of the signal from the tachometric generator
  - Parameters for half-range operation of the motor
  - Structure of the washing group
  - Control parameters for the FUCS anti-unbalancing system
  - Water fill control algorithm
  - Alarm control system

# OPERATION PRINCIPLE

## Traditional washing Operation



- The particles of soiling substances which are freed from the textile fibres by the chemical action of the detergent at the temperature of the washing water are re-moved by the flow of water through the fibres.
- The reversing rotation of the drum causes mechanical interaction between the parts of the load and the detergent solution which separates the particles from the textiles.
- The water level is at such a height that the load is successively lifted from the solution by the ridges formed in the inner drum and then falls back into the solution.
- The Circulation of the solution during the rotation of the drum prevents the accumulation of detergent in the rubber bottom.

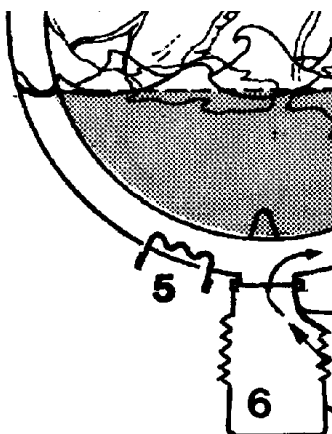
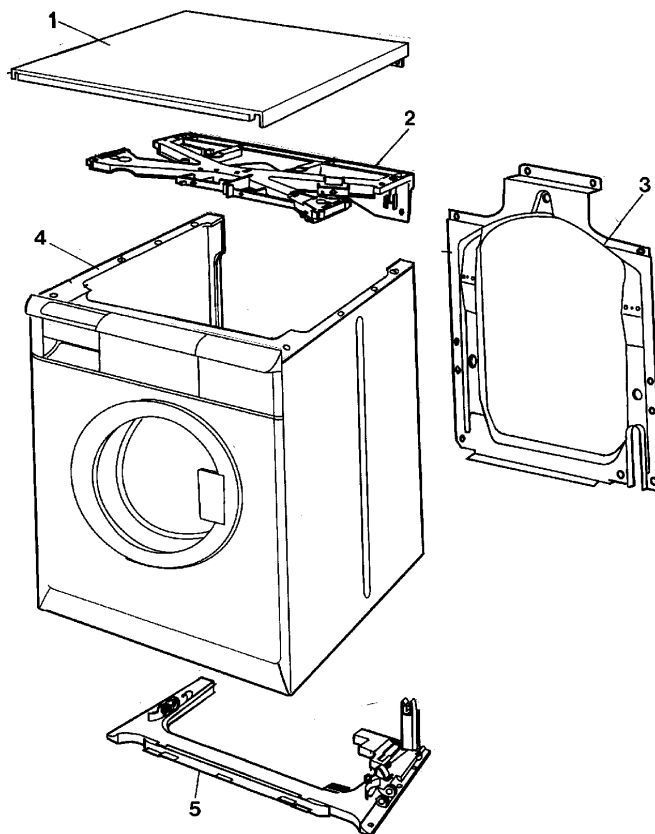
# CONSTRUCTION

## Enclosure

The enclosure consists of: - a lacquered steel sheet pressing forming the front and both sides, fixed between upper and lower CARBORAN frames

- a removable galvanized sheet steel back plate
- a top of lacquered steel sheet, fixed to the rear of the upper CARBORAN frame.

- 1 Top, lacquered steel sheet
- 2 Upper frame, CARBORAN
- 3 Back plate,
- 4 Front and sides, lacquered steel sheet
- 5 Lower frame, CARBORAN

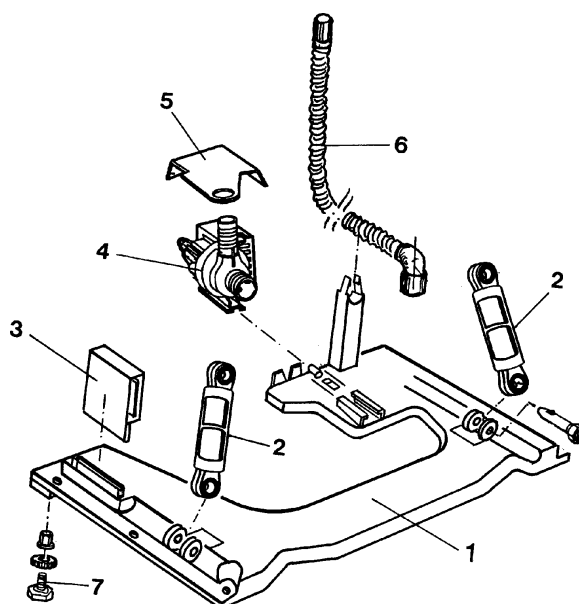


## Upper frame

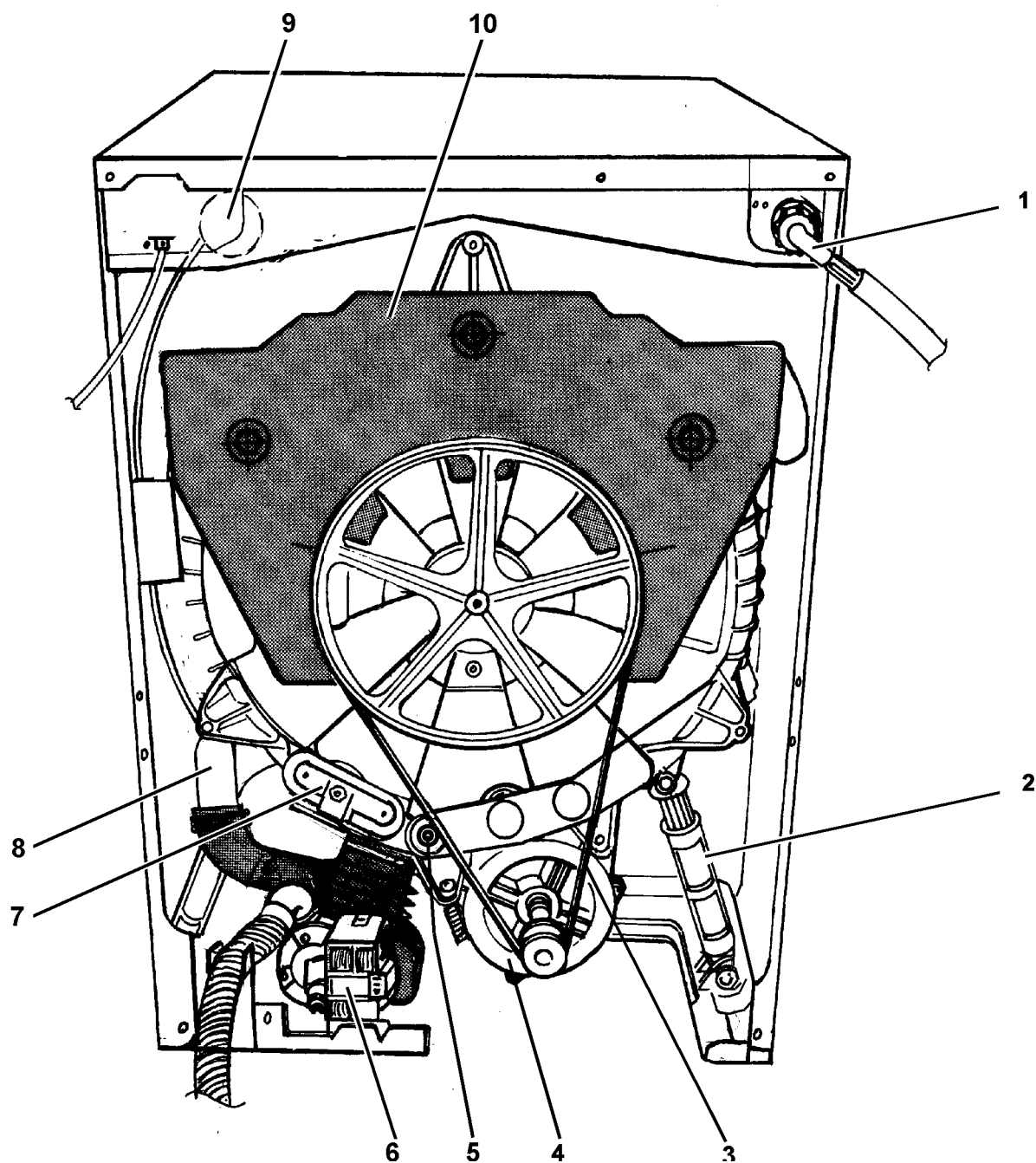
1. Upper frame of CARBORAN®
2. Interference suppressor
4. Spring, drum suspension
5. Level regulator, level 1, level 2, and anti-foam function
6. Level regulator, overflow protection
7. Water supply valve

## Lower Frame

1. Lower frame, of CARBORANO
2. Shock absorber, fixed to frame with plastic pin
3. Electronics unit
4. Drainage pump, inserted in track and locked to lower frame with plastic snap fixing
5. Plastic protection for drainage pump
6. Drainage hose, fixed with two plastic clamps
7. Adjustable rear foot with lock nut



## Rear of machine

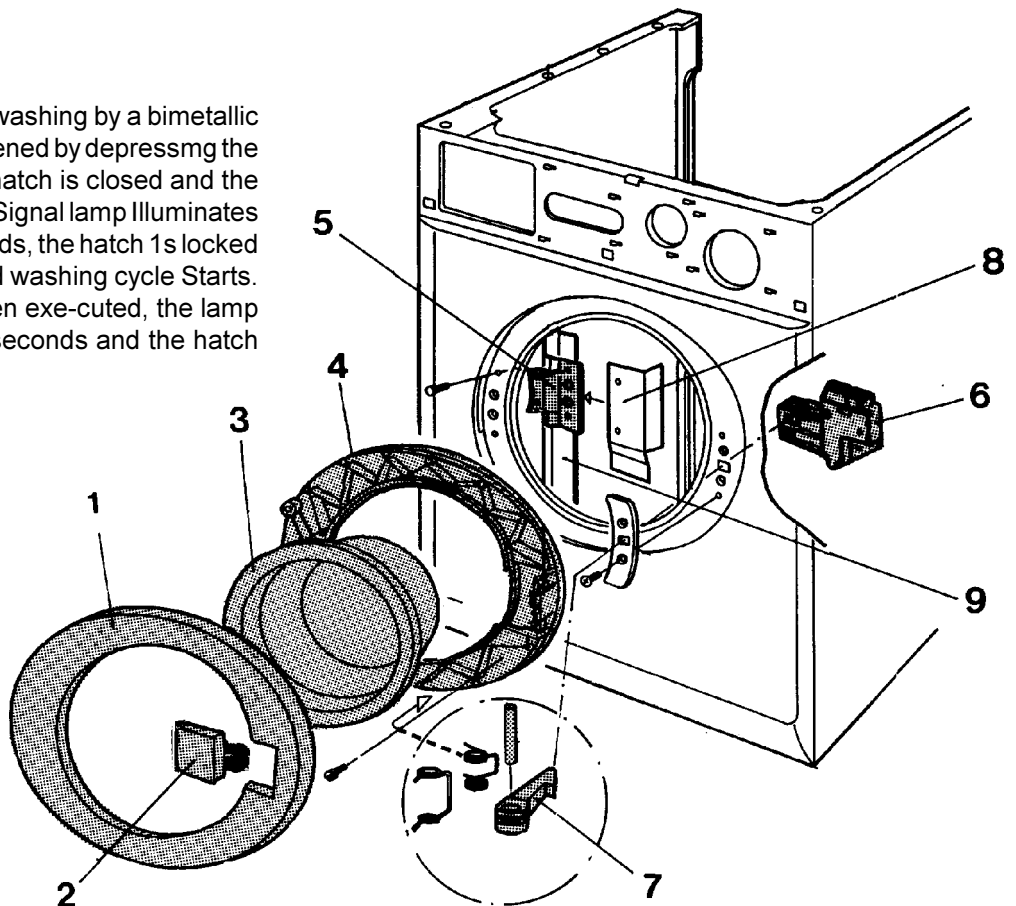


- |   |                                    |    |                          |
|---|------------------------------------|----|--------------------------|
| 1 | Water supply hose                  | 6  | Drainage pump            |
| 2 | Shock absorber                     | 7  | Heating element, 1600 W. |
| 3 | Belt                               | 8  | Pressure chamber         |
| 4 | Motor                              | 9  | Level regulator,         |
| 5 | Temperature sensor, NTC thermistor | 10 | Rear counterweight       |

## Front hatch

The hatch is locked during washing by a bimetallic electric hatch lock and is opened by depressing the hatch lock pad. When the hatch is closed and the On/Off button is pressed, a Signal lamp illuminates after approximately 5 seconds, the hatch is locked electrically and the selected washing cycle starts. When the program has been executed, the lamp extinguishes after 45-120 seconds and the hatch can be reopened.

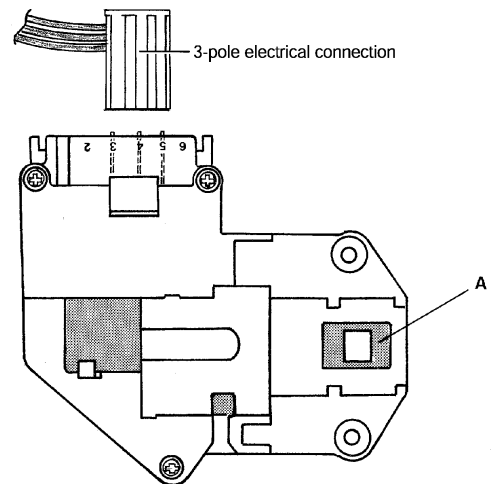
- 1 External hatch frame
- 2 Hatch lock pad
- 3 Hatch glass
- 4 Internal hatch frame
- 5 Hatch hinge
- 6 Electrical hatch lock
- 7 Locklever
- 8 Splash protection
- 9 Supporting beam



## Hatch locking switch

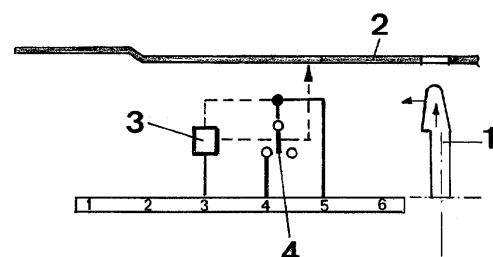
The security of the hatch is ensured by an electromagnetic lock with function as described below.

- when the lock is activated, the voltage-sensing unit closes the switch which connects voltage to the electrical components of the machine.
- During operations, the slide (A) remains mechanically locked and thereby prevents opening of the hatch by fixing the hatch lock lever
- When the hatch lock has been deactivated, it remains locked for approximately 45-120 seconds to ensure that the drum is stationary before the hatch is opened.



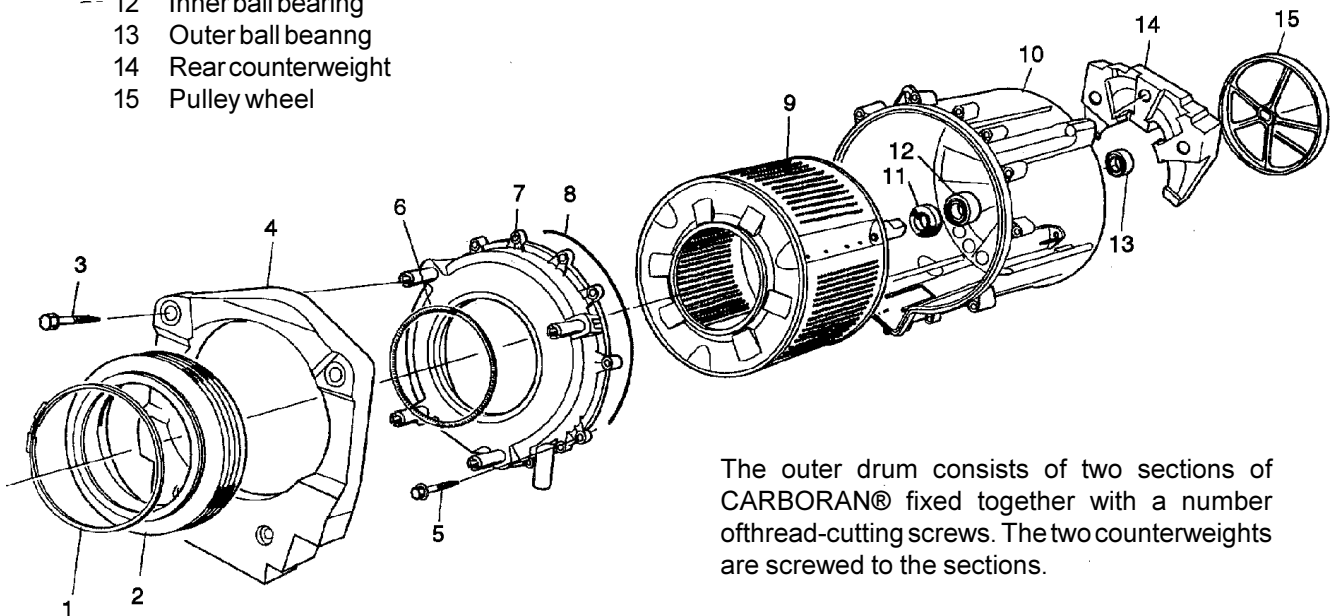
## ELECTRICAL DIAGRAM

- 1 Lock lever (in hatch)
- 2 Slide
- 3 PTC resistor
- 4 Switch activated by the PTC resistor



## Washing unit with outer drum of CARBORAN®

- 1 Ring for fixing bellows to enclosure
- 2 Bellows
- 3 Screw, front counterweight
- 4 Front counterweight
- 5 Screw, front/rear outer drum
- 6 Ring for fixing bellows
- 7 Front section of outer drum, CARBORAN®
- 8 Packing
- 9 Inner drum, stainless steel
- 10 Rear section of outer drum, CARBORAN®
- 11 Drum shaft sealing ring
- 12 Inner ball bearing
- 13 Outer ball bearing
- 14 Rear counterweight
- 15 Pulley wheel



The outer drum consists of two sections of CARBORAN® fixed together with a number of thread-cutting screws. The two counterweights are screwed to the sections.

## “FUCS” (Fast Unbalance Control System)

The control procedure for unbalanced loads is performed dynamically, before each spin cycle, as follows:

- ❑ An initial phase is performed in which the direction of rotation of the drum is alternated at 55 rpm.
- ❑ The phase begins at a speed of 55 rpm; the speed can never fall below this threshold, otherwise the check is repeated.
- ❑ At intervals of 300 ms, the balance is calculated and compared with predetermined limits. If the value is less than the lower limit, the speed of the drum is increased by 2 rpm; if the value is higher, the speed of the drum is reduced by 2 rpm. The reduction in the speed of the drum distributes the washing correctly; this procedure is repeated until the wash load is completely balanced.
- ❑ Correct balancing of the wash load is achieved at a speed of 115 rpm, after which the spin cycle begins.

The Unbalancing Control function takes place in four phases; each phase is characterized by an *unbalancing threshold* and a *time-out* (maximum time).

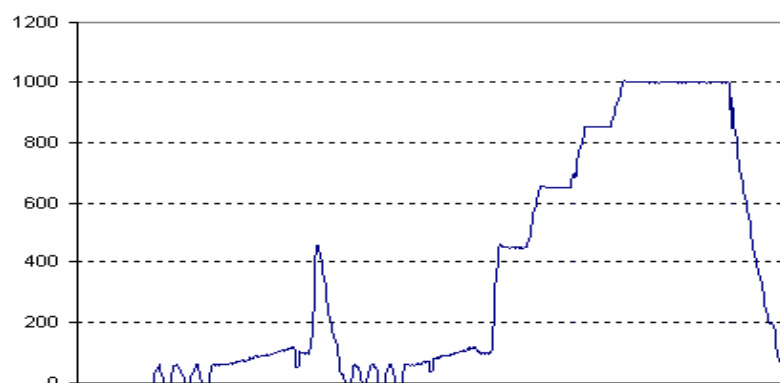
- Phase 0:** Phase 0 has a predetermined unbalancing threshold; if correct balancing of the wash load is achieved, the appliance performs a 470 rpm spin pulse, preceded by 5 seconds at 100 rpm and followed by phase 1; otherwise, after a maximum of 60 seconds, the cycle passes directly to phase 1.
- Phase 1:** The first phase has a different preset unbalancing threshold: if correct balancing is achieved, the appliance performs the spin cycle, preceded by 5 seconds at 100 rpm. If not, after a maximum of 120 seconds, the cycle passes to phase 2.
- Phase 2:** The pre-determined unbalancing threshold in the second phase is different: if correct balancing is not achieved within 60 seconds, the function passes to phase 3.
- Phase 3:** The third phase has a pre-determined unbalancing threshold: if correct balancing is achieved within 90 seconds, a spin pulse is performed, preceded by 5 seconds at 100 rpm and followed by a repeat of phase 1. If the load is highly unbalanced after the second attempt for phase 3, the spin cycle is skipped; if balancing is not perfect, a reduced-speed spin is performed.

### 6.17.1 Examples of operation of the unbalancing control function

The examples shown below describe the operation of an appliance with a final spin speed of 1000 rpm.

#### Perfect balancing

- Low speed
- FUCS phase 0 + spin pulse
- Low speed
- FUCS phase 1
- Normal spin



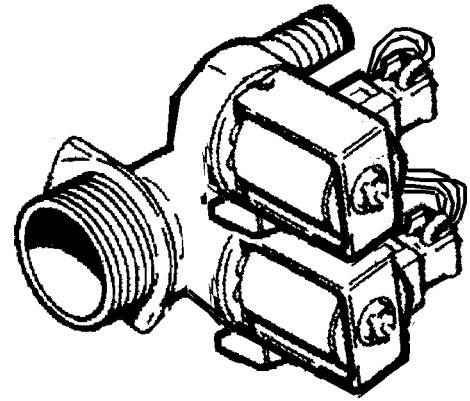
## Double water supply valve

### General characteristics

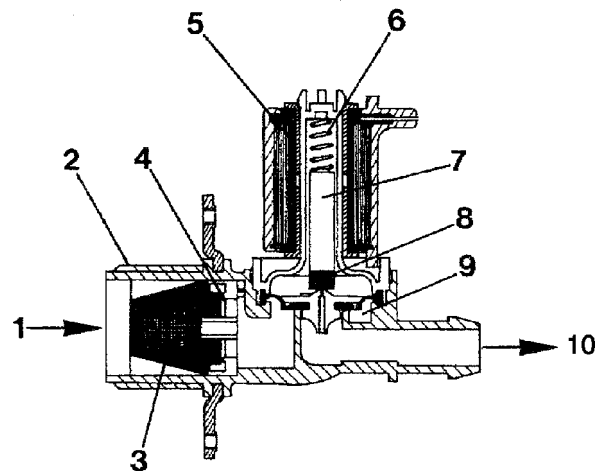
This electro-magnetic controlled valve regulates the supply of water to the machine. It is actuated by a solenoid which is controlled by the electronic module via the level regulator.

When the valve is inactive, (without voltage) the spring holds the spindle down and the rubber cone seals a small hole at the centre of the membrane. A head of water builds up which holds the membrane against its seating and closes the valve.

When voltage is applied to the solenoid, the spindle with the rubber cone is drawn up-ward against the spring and the hole in the membrane is exposed, permitting the passage of water. The pressure differential is lost and water can flow freely through the valve.



- 1 Water entry
- 2 Valve housing
- 3 Filter
- 4 Flow regulator
- 5 Coil
- 6 Spring
- 7 Spindle
- 8 Rubber cone
- 9 Membrane
- 10 Water delivery

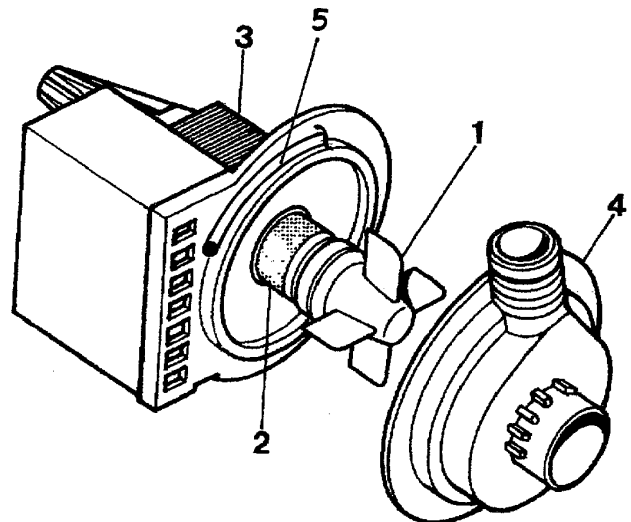


## Drainage pump

- 1 Impeller
- 2 Rotor
- 3 Stator
- 4 Pump housing
- 5 O-ring

The rotor consists of a permanent magnet which can rotate clockwise or anti clock-wise. The rotor can rotate one quarter revolution without movement of the impeller.

If the impeller seizes, the rotor can therefore make small movements in both directions until the impeller is freed. An unusual sound may be heard at start which is quite normal.



### Function check

- 1 Check that the impeller can move freely.
- 2 Check the resistance of the Stator winding. This should be 170 Ohm.

Max. capacity = 20 l/mm.  
Power consumption = 30 W



## Heating Element

### General characteristics

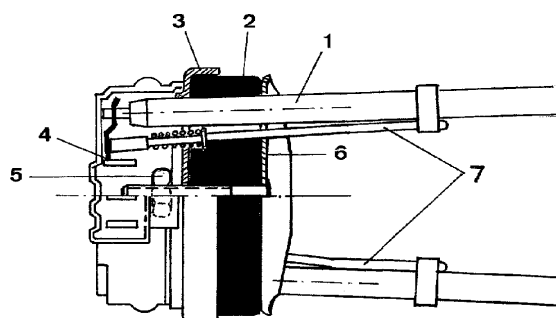
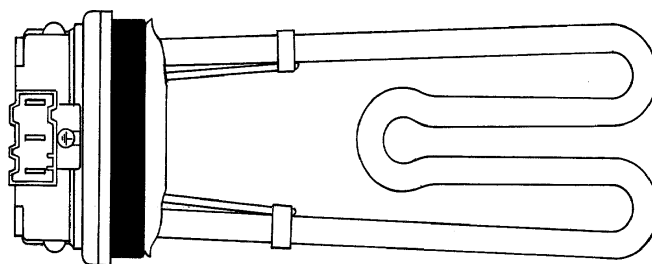
The element for heating the water is of the encapsulated type, i.e. the spiral resistor is hermetically sealed in a stainless steel enclosure.

Power 1600 W

Resistance	230 V	31.2 - 34.3 Ohm
	240 V	33.9 - 37.4 Ohm

- 1 Element
- 2 Rubber packing
- 3 Fixed flange
- 4 Electrical connection pin
- 5 Locking nut
- 6 Adjustable flange
- 7 Fuse

The seal between the element and the outer drum is obtained with a rubber packing which expands when the locking nut is tightened.

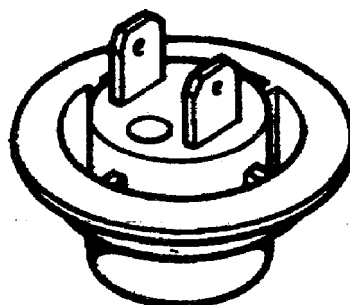


## NTC-Thermistor (Temperature control)

Temperature control by means of NTC thermistors is incorporated in models controlled by Programmed control units VA 60, VB 60 and VE 60.

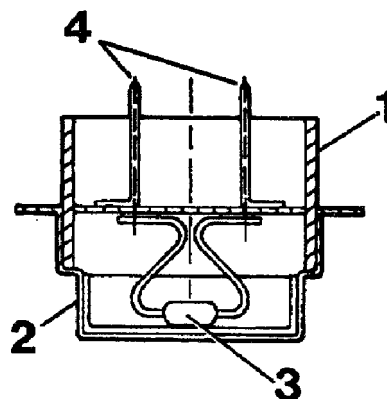
### NTC temperature sensors

- 1 Plastic housing
- 2 Metal capsule
- 3 NTC resistance
- 4 Electrical contacts



### Table with resistance at different temperatures (3%)

Temperature °C	Resistance kOhm
30	17.3
40	11.5
50	7.84
60	5.46
70	3.90
78	2.97
85	2.32



The temperature of the washing water is controlled by the microprocessor via an NTC sensor.

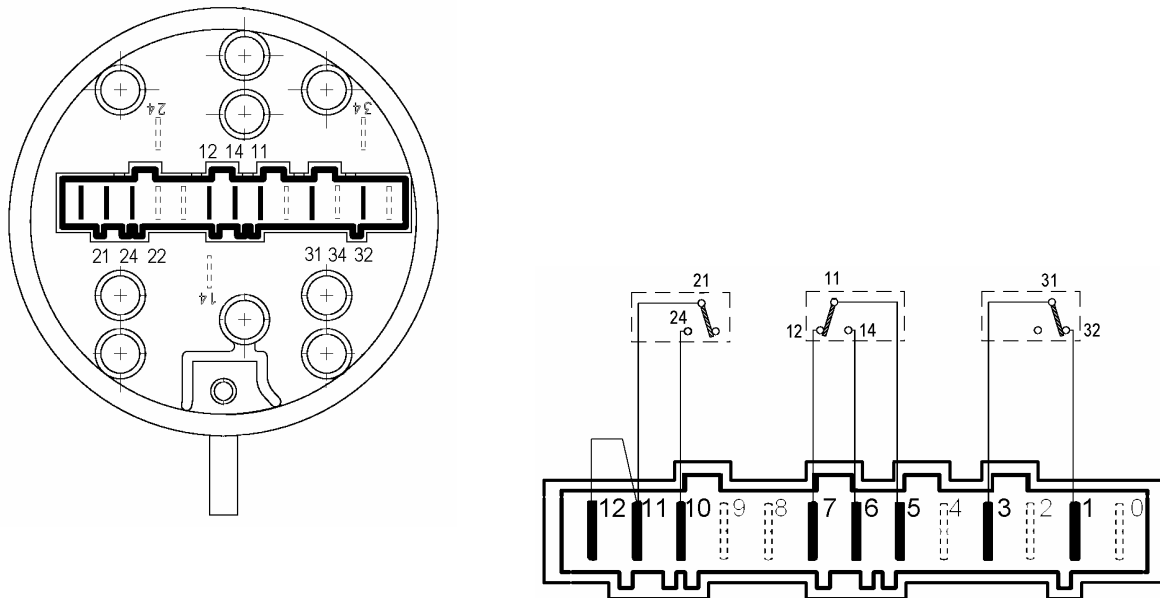
The internal resistance of the sensor decreases as the temperature increases. This decrease is registered by the microprocessor which disconnects the heating element when the required temperature has been reached.

With a short-circuit or other failure in the NTC thermistor, the control unit cancels the heating stage and completes the program without heating.

## Control pressure switch for water level in the tub

Control of the water level is performed by a three-level pressure switch which functions as follows:

- contact **11-14**: anti-boiling safety level
- contact **21-24**: first level
- contact **31-32**: anti-overflow safety level (*not all models*)



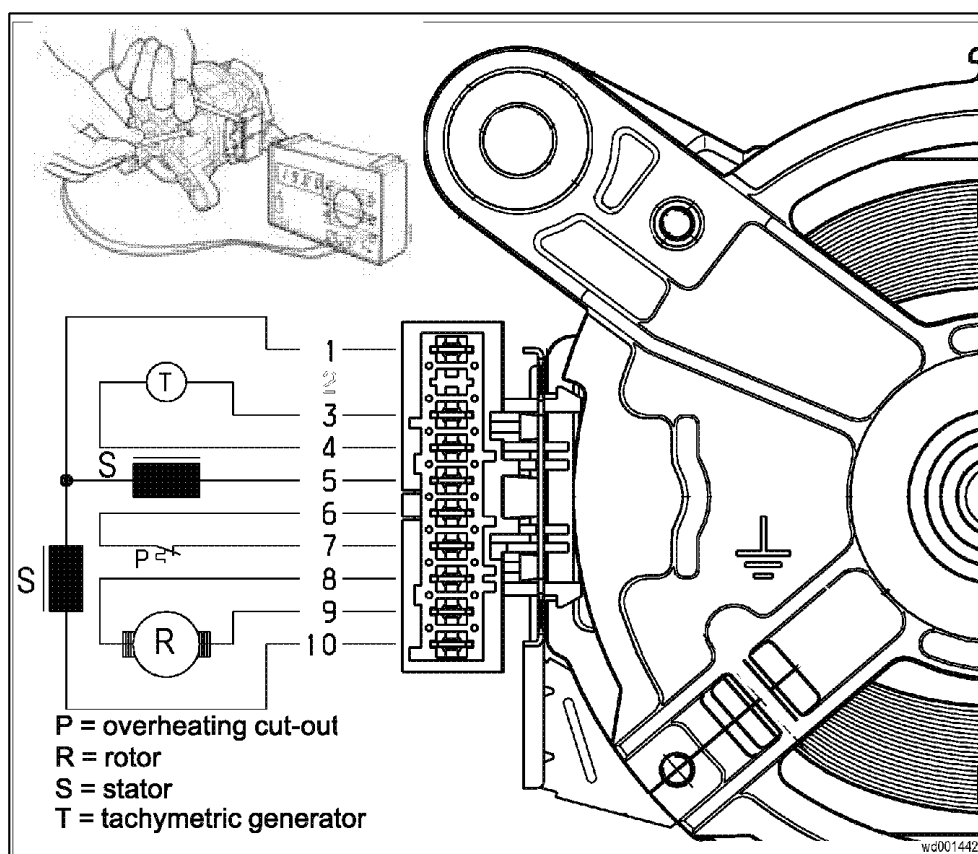
### Pressure switch settings

	Full (mm)	Reset (mm)
Anti-boiling level	55± 3	35± 3
1st level	80± 3	55± 3
Anti- overflow level	390± 15	240±50

### Water fill without wash load

	G20 tub (drum volume 47 l)	G19 tub (drum volume 42 l)
Anti-boiling level (litres)	3,9 (3,5÷4)	3,5 (3,3÷3,8)
1st level (litres)	6,5 (6÷6,7)	5,8 (5,2÷6,3)

## Checking the commutator motors



- 1) Check the connector blocks (wiring) and check for detached or bent terminals.
- 2) Check for the presence of traces / residue / build-up of water or detergent, and identify the source.
- 3) Use a tester with a minimum scale of 40 Mohm to check for windings or other components that are connected to mass or poorly earthed (read  $\infty$ ) across each terminal and the casing.
- 4) Check that each of the windings is as shown in the table below

Motor terminals	Check:	SOLE Motor [W]	F.H.P. Motor [W]	CE.SE.T. Motor [W]
3 - 4	Tachymetric generator winding	171 ÷ 196	126 ÷ 147	64 ÷ 73
		469 ÷ 540		
5 - 10	Stator winding (full range)	1.0 ÷ 2.2	1.0 ÷ 3.0	1.0 ÷ 2.0
6 - 7	Overheating (cut - off)	0	0	0
8 - 9	Rotor winding	1.5 ÷ 3.0	1.5 ÷ 3.0	1.5 ÷ 3.0

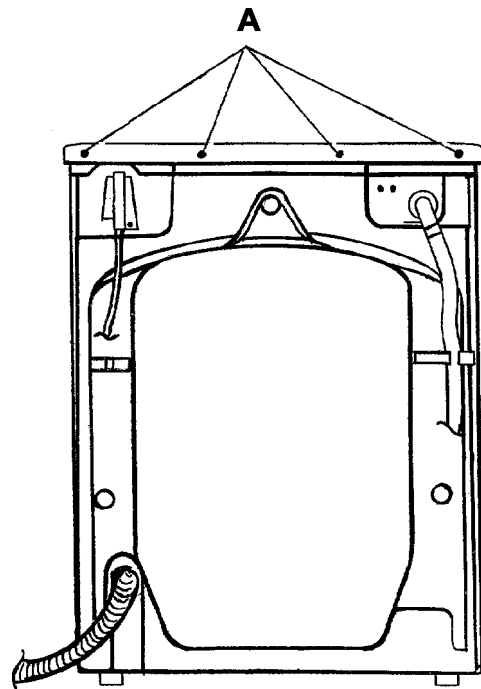
### Note:

When checking the rotor winding, the measurement should be taken around the entire perimeter, turning the shaft very slowly and checking for the presence of short-circuits between the visible plates. Check the brushes for wear.

## SERVICE/ACCESSIBILITY

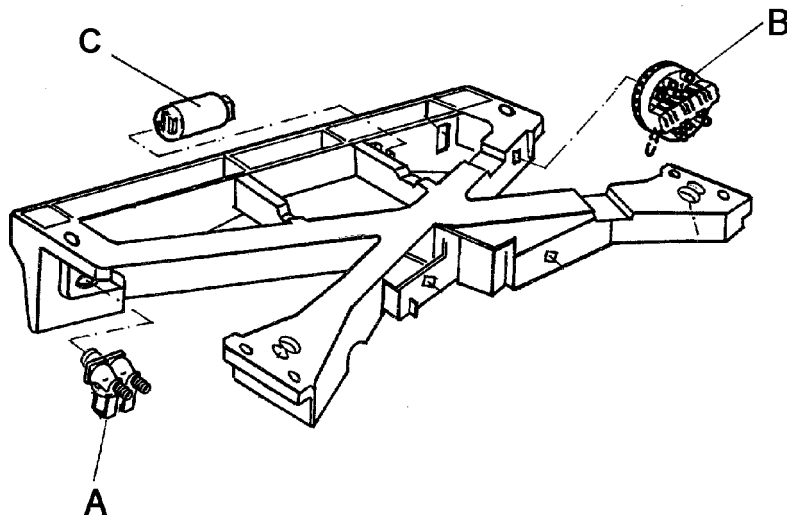
### Top plate

- 1 Remove the 4 screws (A) at the rear edge of the plate.
- 2 Draw the top plate backward



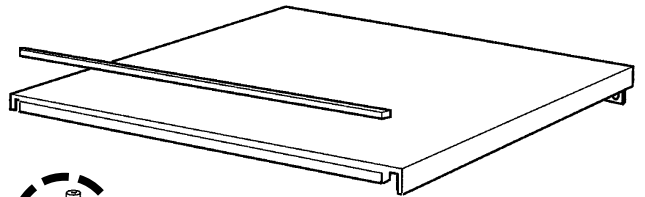
### Accessibility:

- A Supply valve
- B Level regulator, Pressostat
- C Interference filter



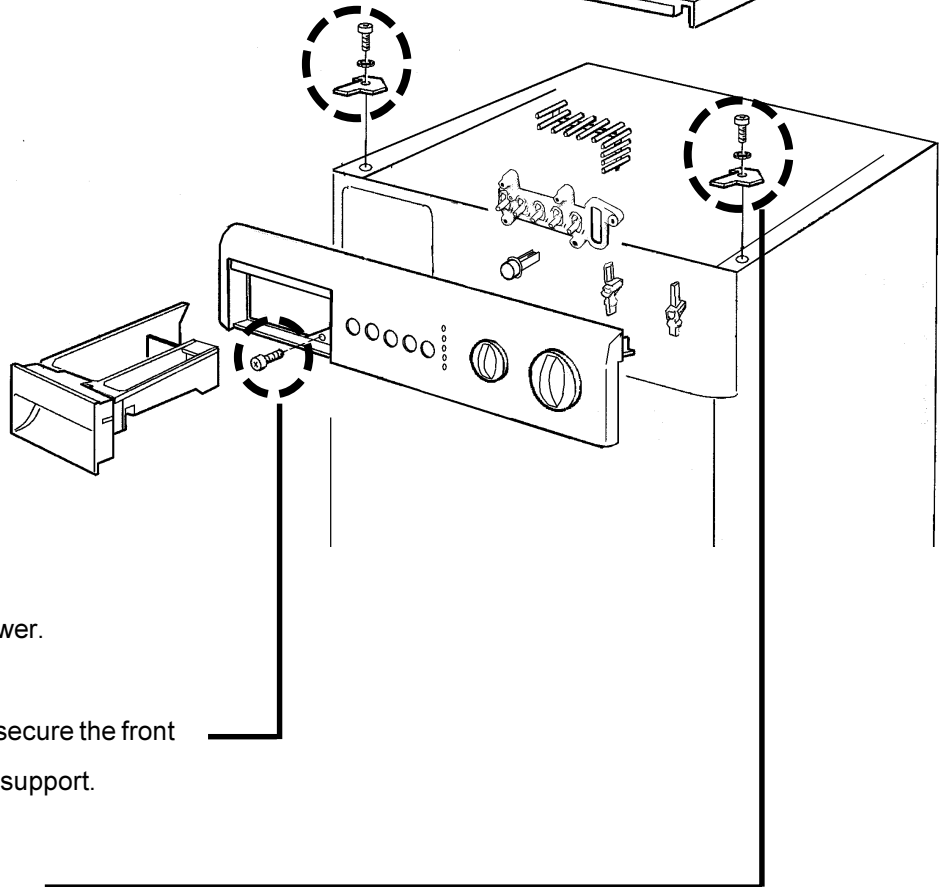
## Top panel

- a. Remove the two rear screws, push the top panel towards the rear and release from the cabinet.



## Control panel

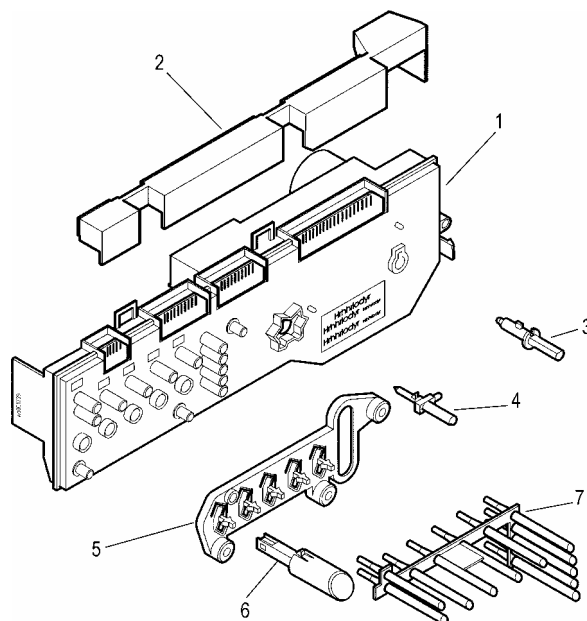
- a. Remove the top panel.
- b. Remove the detergent drawer.
- c. Remove the screw which secure the front of the control panel to the support.
- d. Remove the upper screws.
- e. Remove the control panel by raising the control panel slightly.



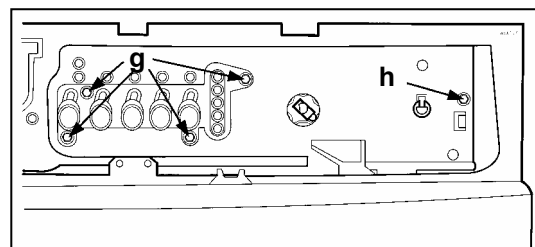
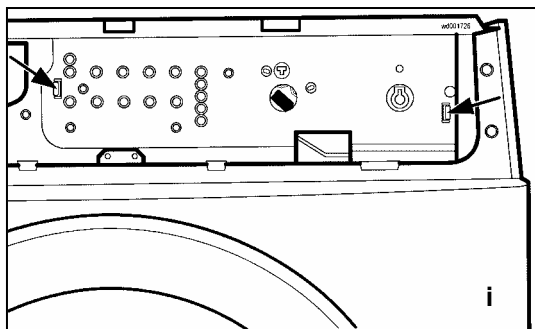
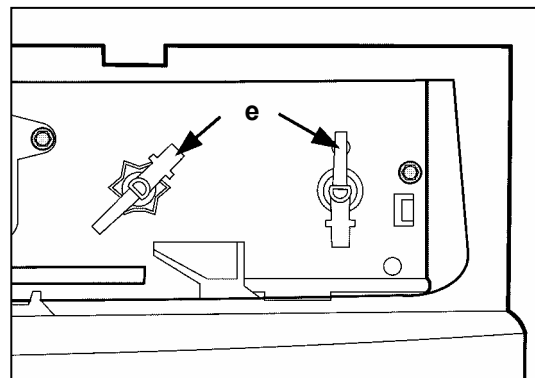
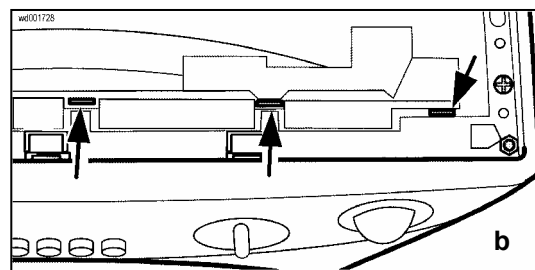
*When re-assembling, ensure that the knobs are replaced in the correct positions.*

## Electronic control board

1. PCB assembly + casing
2. Cover for connectors
3. Spindle of programme selector knob
4. Cover for connectors
5. Spindle of secondary selector knob
6. Pushbutton support panel
7. Pushbutton
8. LED diffuser



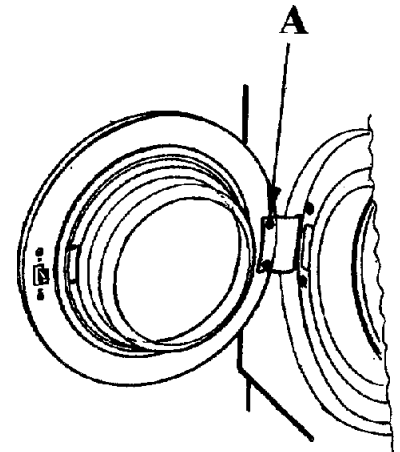
- a. Remove the control panel.
- b. Detach the cover for the connectors from the control board casing.
- c. Detach the wiring from the PCB.
- d. If necessary, remove the coloured diffusers from the board casing.
- e. Remove the knob flanges from the spindles of the selectors.
- f. Remove the spindles from the selectors. Ensure that the position of the selectors is as shown in the figure, i.e. CANCEL/OFF for the programme selector, last clockwise position for the secondary selector. Use pliers to remove the spindle of the second selector (if featured): this operation may damage the plastic board casing; it is therefore advisable to **use a new spindle for the new board**.
- g. Remove the four screws which secure the pushbutton support panel to the board and remove the support/pushbutton assembly.
- h. Remove the other screw which secures the board to the control panel support.
- i. Release the two anchor tabs and remove the electronic board assembly.



# Hatch

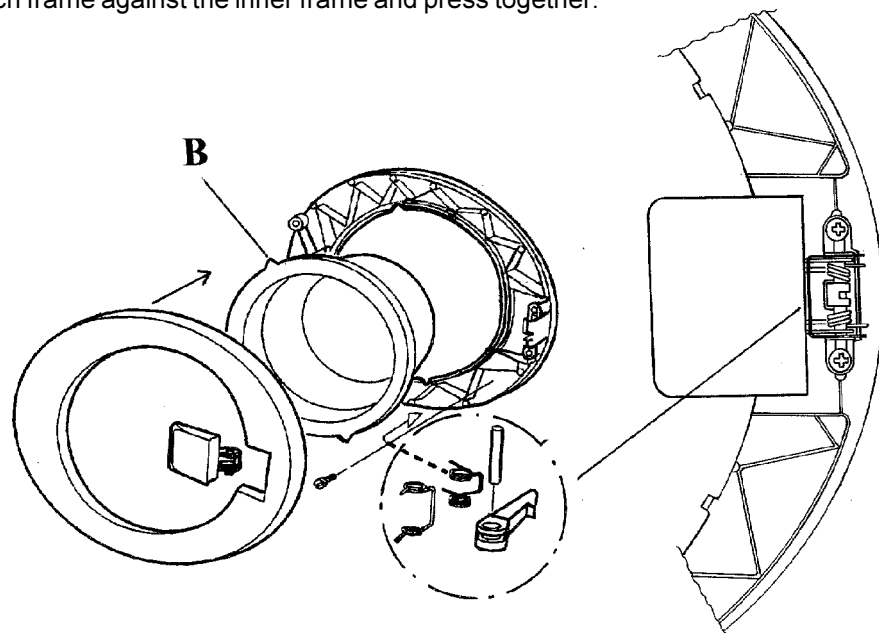
## Removal:

- 1 Remove the two screws (A) holding the hatch to its hinge.
- 2 The outer hatch frame is snapped over the outer edge of the inner hatch frame. Carefully lever the frames apart and remove the outer frame.
- 3 The opening pad with springs, fixed to the inner frame with 2 screws is now accessible.
- 4 The hatch glass is fixed in the inner frame with 4 plastic projections. Bend these open to permit removal of the glass.



## Re-assembly:

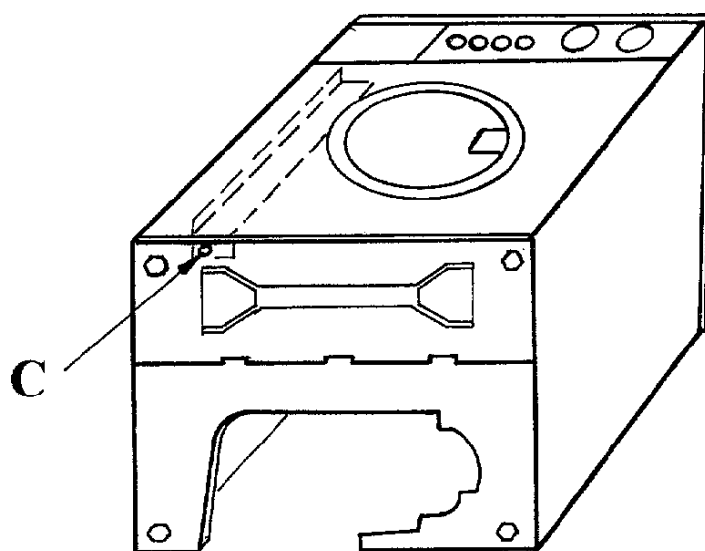
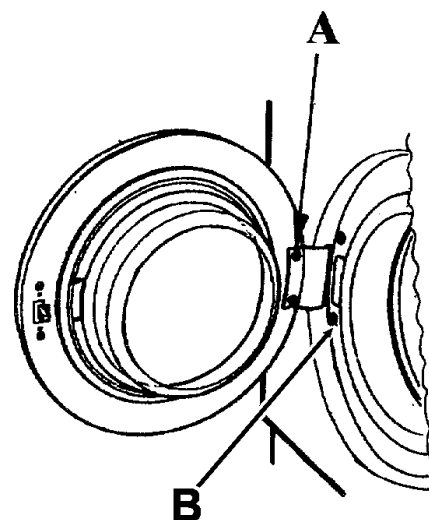
- 1 Place the glass against the inner hatch frame. Check that the 2 projections (B) on the edge of the glass are in line with the corresponding spaces in the inner frame and press into position past the plastic projections.
- 2 Place the outer hatch frame against the inner frame and press together.



Hatch lock fixed to the Inner hatch

## Hatch hinge

- 1 Remove the hatch from the hinge. (Screws A)
- 2 Remove the locking ring around the outer part of the bellows and remove the bellows.
- 3 Press the bellows inward toward the drum to permit passage of the hinge.
- 4 Remove the two screws (B) fixing the hinge. Note the locking nuts on the inside.
- 5 To simplify Installation of a new hinge, the Internal beam supporting the hinge is also to be removed. Lean the machine backward and remove the screw (C) fixing the beam to the bottom edge of the front (under the machine).
- 6 Then remove both hinge and beam.

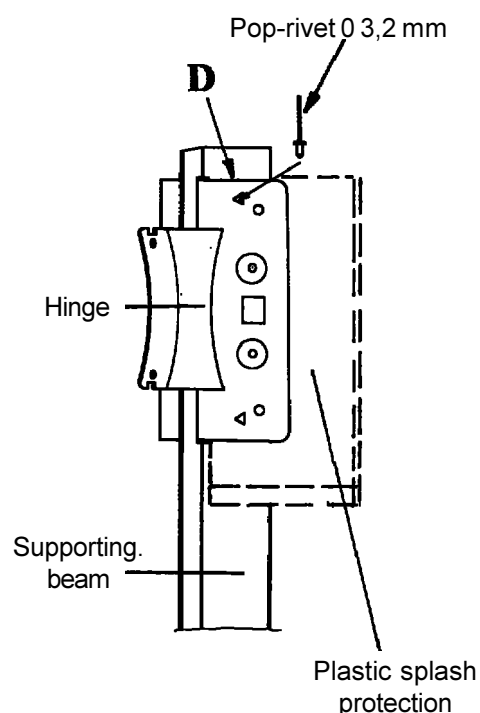


## Re-assembly:

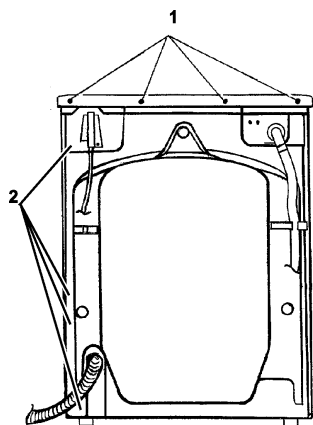
- 7 To Install a new hinge, It is simplest to fix the hinge first against the supporting beam by means of a pop-rivet through the upper triangular hole in the hinge and the hole in the corresponding place in the beam (D). If no such hole is available, mark the beam through the triangular hole and drill a hole  $\varnothing 3.5$  mm. Mount the pop-rivet with its head toward the hinge.

**Note** that the plastic splash protection is to be located between the hinge and the supporting beam when mounting the pop-rivet.

- 8 Then insert the hinge with supporting beam through the hatch opening. Fix with screws and locking nuts. Refit the beam in position against the bottom edge of the front.







## Rear of machine

- 1 Remove the 4 screws fixing the back plate to the top plate (1).
- 2 Remove the 11 screws around the edges of the back plate (2).
- 3 Remove the back plate.

### Accessibility:

#### A Belt and pulley

- The pulley is fixed to the drum axle with a 5 mm hex. socket head screw.

#### B Electronic circuit board for speed control of motor

- Disconnect the electrical contacts and press the plastic snap fixing (under the machine ) to the side and then lift out the electronics unit.

#### C Motor

- This is fixed with 4 hex. socket head screws to the outer drum. Use an 8 mm Allen key to remove these screws.

#### D Removal of heating element

- Disconnect the electrical contacts.
- Remove the nut at the middle of the element (that which expanded the pack-ing).
- Then press the threaded section inward.
- Withdraw the element from the outer drum.

#### E Temperature sensor, NTC thermistor

- Disconnect the electrical contacts.
- Carefully lever, using a screwdriver, the rubber bushing from the outer drum.
- Remove the NTC thermistor from the rubber bushing.

#### F Removal of drainage pump

- Slacken the hose clamps and remove the hoses from the pump.
- Disconnect the electrical contacts and remove the plastic protection over the pump.
- Push down the plastic projection (H) and withdraw the pump backward.

#### G Rubber bottom, (pin trap)

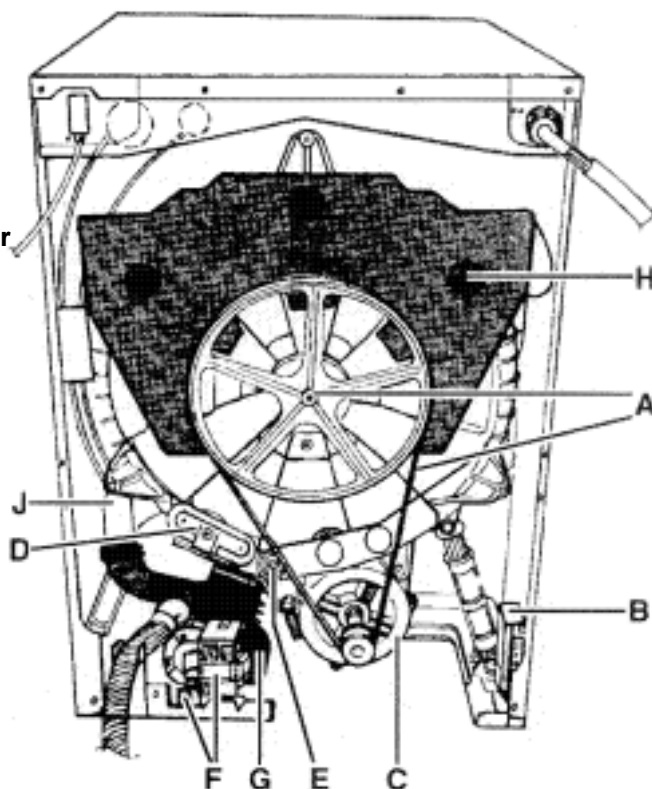
- Slacken the clamps holding the hoses fixed to the rubber bottom.

#### H Rear counterweight

- Remove the belt and pulley.
- Remove the 3 screws fixing the counterweight to the outer drum.
- Lift the counterweight away from the expander bolt fixmgs.

#### J Pressure chamber

- Remove the hose clamp at the rubber bottom.
- Remove the screw (8 mm socket) holding the pressure chamber to the outer drum.
- Draw the Container backward and remove the hoses to the pressure (water level) switch.



## Drum unit

(to be lifted out when replaeing inner drum, bearing or front counterweight).

- 1 Remove top plate and rear plate.
- 2 Remove the clamping ring around the hatch opening and then separate the bellows from the front.
- 3 Disconnect all of the electrical contacts from the drum unit (heating element, motor and temperature sensor).
- 4 Disconnect the drainage hose and the drainage pump from the rubber bottom (see page 33).
- 5 Disconnect the hoses between the detergent dispenser and the outer drum (at the drum).
- 6 Disconnect the air hoses at the level regulators.
- 7 The rear counterweight and the motor can be removed from the drum unit to simplify the lifting of the drum unit out of the enclosure.
- 8 Remove the pressure chamber and the electronics unit to obtain access to the shock absorbers.
- 9 Disconnect the shock absorbers from the drum unit by removing the pin at the upper fixing.
- 10 Lay the machine on the floor, front downwards, making suitable arrangements to protect knobs, buttons etc. against damage.
- 11 Disconnect the suspension springs from the upper part. This can be simplified by placing a wire loop under the end of the spring and pulling on the loop with a "handle" - a screwdriver or similar.
- 12 Grip the pulley and lift the drum unit, (with back so straight as possible), off the chassis. It is recommended that two persons perform this operation.

## Shock absorbers

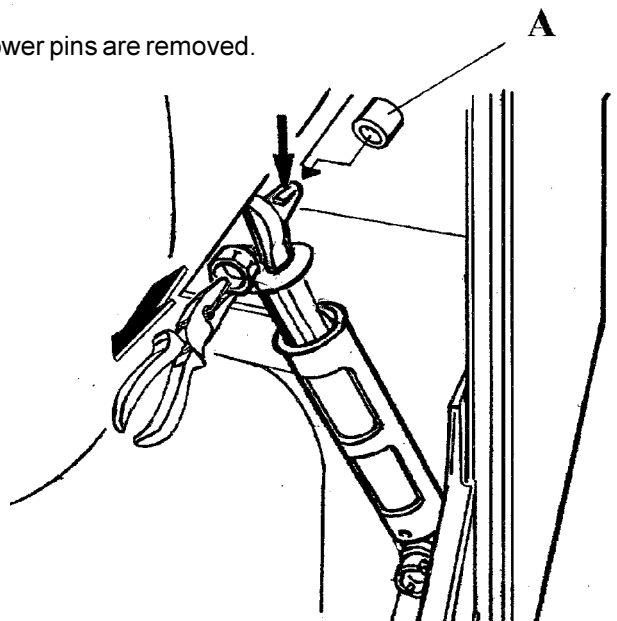
The shock absorbers are installed between the lower frame and the drum unit and are held in positlon in the fixmgs with pms.

### Removal of shock absorbers:

- Depress the lockmg catch by pushmg a pipe socket (A) over the end ofthe pin and the catch, (internal diameter of socket (0 = 14 mm.).
- Withdraw the pin from its fixmg with pliers.
- The shock absorber can be removed when the upper and lower pins are removed.

### Replacement:

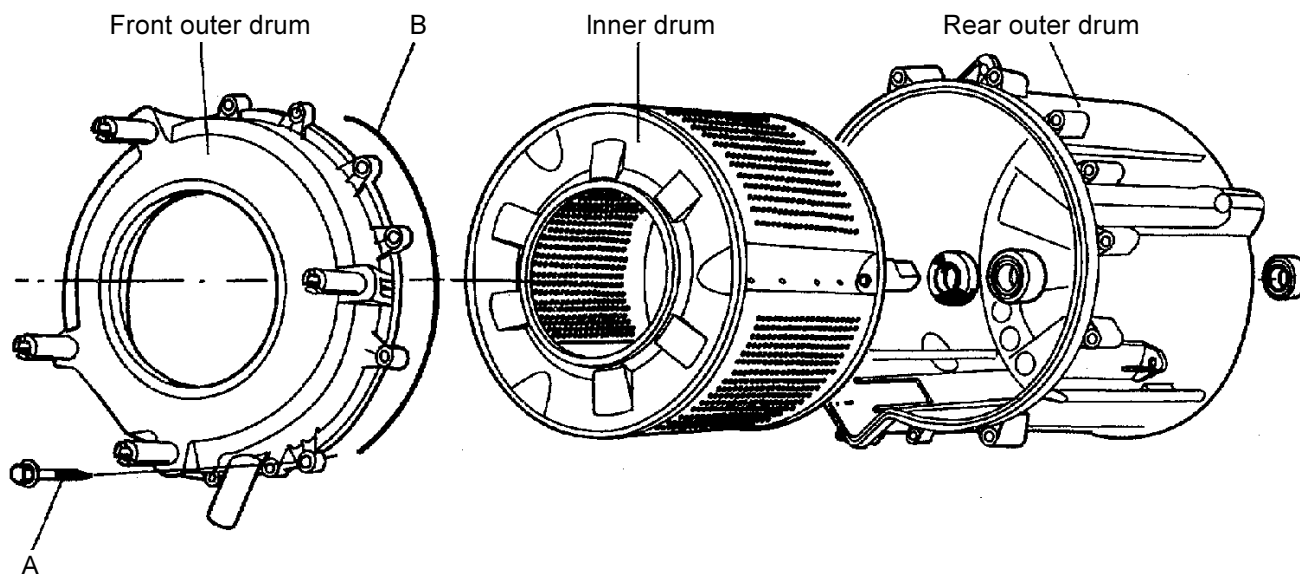
- As the original pms may be damaged during withdrawal, new pms should be used.
- „Lubricate“ the pm with some type of alcohol. The lubricant must evaporate after insertion of the pins and grease may not be used.
- Rotate and fully insert the pm from elther side.
- Check that the locking catches project and lock the pins correctly.



## Outer drum with drum bearing

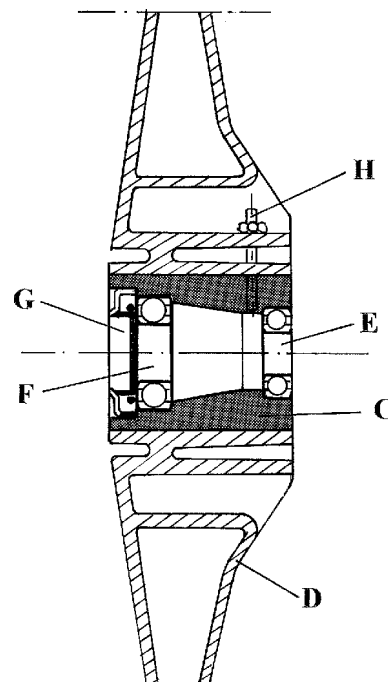
The outer drum consists of two sections of CARBORAN with a sealing ring between, fixed together with a number of thread-cutting screws (A).

When installing the sealing ring, the splice, marked with red, is to be located upward so that the red marking is visible at the recess on the upper sides of the drum sections.



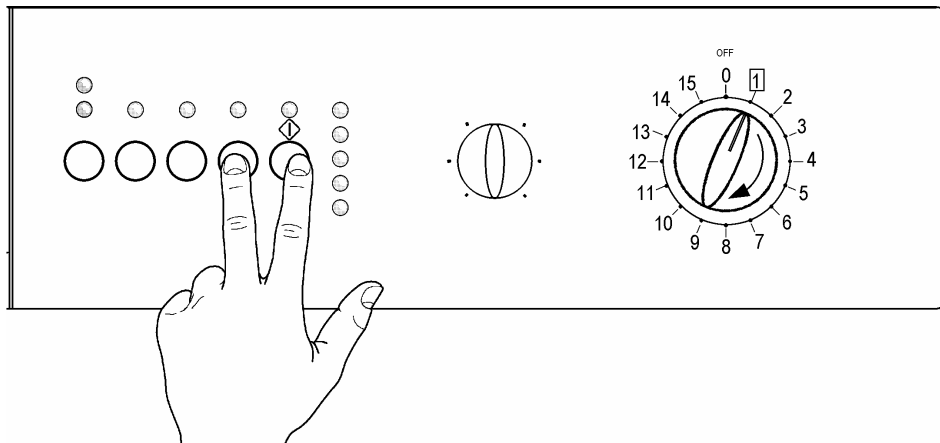
The bearing which carries the drum axle is installed inside a cylindrical steel support embedded in the rear section

- D Outer rear drum section
- E Rear ball bearing (0 40 mm. type 6203-2Z).
- F Front ball bearing (0 53 mm. type 6205-2Z).
- G Drum axle seal
- H Earth connection pin.



# DIAGNOSTICS SYSTEM

## Access to diagnostics mode



1. Switch off the appliance.
2. Press and hold down **START/PAUSE** and **any one of the option buttons** simultaneously.
3. Holding down both buttons, switch the appliance on by turning the programme selector **one position to the right** (clockwise).
4. Continue to hold down the START/PAUSE and option buttons until the LED begins to flash (at least 2 seconds).

**Remark:** The **START/PAUSE** button can be configured according to the styling of the model, and is therefore not always in the position shown in the figure.

In the first selector position, the operation of the buttons and the relative LEDs is checked; turning the selector knob clockwise activates the diagnostics cycle for the operation of the various components and displays any alarm conditions.

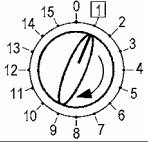
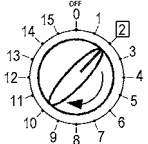
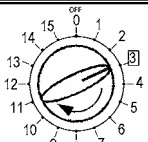
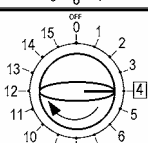
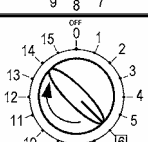
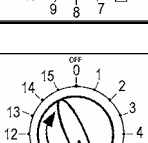
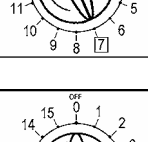
## 7.2 Exiting diagnostics mode

→ To exit the diagnostics cycle, switch the appliance off, then on, and then off again.

## Diagnostics phases

Irrespective of the type of PCB (i.e. with horizontal or vertical buttons) and the configuration of the programme selector it is possible, after entering diagnostics mode, to perform diagnostics on the operation of the various components and to read the alarms by turning the programme selector **clockwise**.

All the alarms are enabled during the diagnostics cycle.

Selector position	Components actioned	Operating conditions	Function checked
<b>1</b> 	<ul style="list-style-type: none"> <li>- All the LEDs light in sequence</li> <li>- When a button is pressed, the corresponding LED lights (and the buzzer, if featured, sounds)</li> </ul>	Always activated	Operation of the user interface
<b>2</b> 	<ul style="list-style-type: none"> <li>- Door interlock</li> <li>- Washing solenoid</li> </ul>	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through washing compartment
<b>3</b> 	<ul style="list-style-type: none"> <li>- Door interlock</li> <li>- Pre-wash solenoid</li> </ul>	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through pre-wash compartment
<b>4</b> 	<ul style="list-style-type: none"> <li>- Door interlock</li> <li>- Pre-wash and wash solenoids</li> </ul>	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through conditioner compartment
<b>6</b> 	<ul style="list-style-type: none"> <li>- Door interlock</li> <li>- Washing solenoid if the level of water in the tub is below 1st level</li> <li>- Heating element</li> </ul>	Door locked Water level above 1st level Maximum time 10 minutes or up to 90°C (*)	Heating
<b>7</b> 	<ul style="list-style-type: none"> <li>- Door interlock</li> <li>- Washing solenoid if the level of water in the tub is below 1st level</li> <li>- Motor (55 rpm clockwise, 55 rpm counter-clockwise, 250 rpm impulse)</li> </ul>	Door locked Water level above 1st level	Check for leaks from the tub
<b>8</b> 	<ul style="list-style-type: none"> <li>- Door interlock</li> <li>- Drain pump</li> <li>- Motor up to 650 rpm then at maximum spin speed</li> </ul>	Door locked Water level lower than anti-boiling level for spinning	Drain and spin; control of congruence in closure of level pressure switches

(\*) In most cases, this time is sufficient to check the heating. However, the time can be increased by repeating the phase without draining the water: pass for a moment to a different phase of the diagnostics cycle and then back to the heating control phase (if the temperature is higher than 80°C, heating does not take place).

# ALARMS

## User alarm display

**Control of the alarm system can be configured; according to the model, therefore, some or all of the alarms may be displayed to the user.**

Normally, all alarms are displayed for the used, with the exception of:

- ◆ E61 (insufficient heating during the washing phase)
- ◆ E83 (error in selector reading)

## Operation of the alarm system during normal use

The alarms are enabled during the execution of the washing programme, with the exception of alarms associated with configuration and the power supply (voltage/frequency), which are also displayed during the programme selection phase.

The door can normally be opened (except where specified) when an alarm condition has occurred on condition that:

- The level of the water in the tub is below 1st level
- The temperature of the water is lower than 40°C.

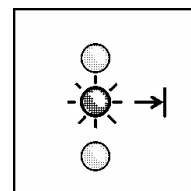
Certain alarm conditions require that a drain phase be performed before the door can be opened:

- Cooling water fill if the temperature is in excess of 60°C.
- Drain until closure of both pressure switch contacts (1st level and anti-boiling safety system) on EMPTY within a maximum of 5 minutes.

## Alarms displayed during normal operation

The type of alarm condition is displayed to the user by the repeated flashing of the END OF CYCLE LED (0.4 seconds lit, 0.4 seconds off, with an interval of 2.5 seconds between sequences). This LED is featured on ALL MODELS, though configured in different positions.

All the LEDs flash to indicate a configuration error.



If, for example, the user should forget to close the door, the control system will detect alarm E41 about 15 seconds after the start of the cycle; the cycle remains in PAUSE mode and the LED flashes repeatedly in the sequence shown in the table.

The four flashes indicate the first of the two digits of alarm E41 (the alarms for a given function are grouped in “families”).

In this case, after closing the door, it is sufficient to press START in order to re-start the programme.

END OF CYCLE LED		→
ON / OFF	Time (sec.)	Value
	0.4	1
	0.4	
	0.4	2
	0.4	
	0.4	3
	0.4	
	0.4	4
	0.4	
	2.5	Pause between sequences

## Reading the alarm codes

In order to read the last alarm code memorized in the EEPROM on the PCB:

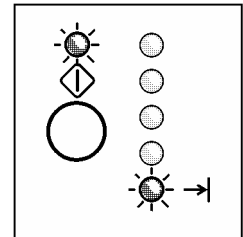
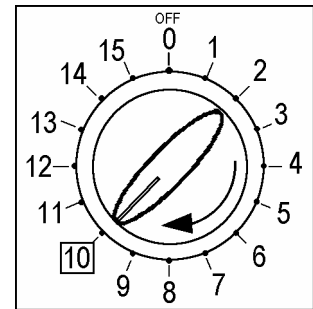
- Enter diagnostics mode.
- Irrespective of the type of PCB and configuration, turn the programme selector **clockwise** to the **tenth position**.

### Displaying the alarm

The alarm is displayed by a repeated flashing sequence of the two LEDs (0.4 seconds lit, 0.4 seconds off, with an interval of 2.5 seconds between sequences). The buzzer (if featured) will sound “bips” in synchronization with the flashing of the LEDs:

- **END OF CYCLE LED** → indicates the first digit of the alarm code (family)
- **START/PAUSE** → indicates the second digit of the alarm code (number within the family)

These two LEDs are featured on all models (though they are **configured differently**), and flash simultaneously.



Notes:

- The first letter of the alarm code “E” (Error) is not displayed, since this letter is common to all alarm codes.
- The alarm code “families” are shown in hexadecimal; in other words:
  - **A** is represented by 10 flashes
  - **B** is represented by 11 flashes
  - ...
  - **F** is represented by 15 flashes
- Configuration errors are shown by the flashing of all the LEDs (user interface not configured).

### Examples of alarm displays

Example: Alarm E43 (problems with the door interlock Triac) will display the following:

- the sequence of four flashes of the END OF CYCLE LED indicates the first number (E**43**);
- the sequence of three flashes of the START/PAUSE LED indicates the second number (E**43**).

END-OF-CYCLE LED →			START/PAUSE LED ◇		
ON / OFF	Time (Sec.)	Value	ON / OFF	Time (Sec.)	Value
	0.4	1		0.4	1
	0.4			0.4	
	0.4	2		0.4	2
	0.4			0.4	
	0.4	3		0.4	<b>3</b>
	0.4			0.4	
	0.4	<b>4</b>		3,3	Pause
	0.4				
	2.5	Pause			

### Operation of alarms during diagnostics

All alarms are enabled during the components diagnostics phase.

## Rapid reading of alarm codes

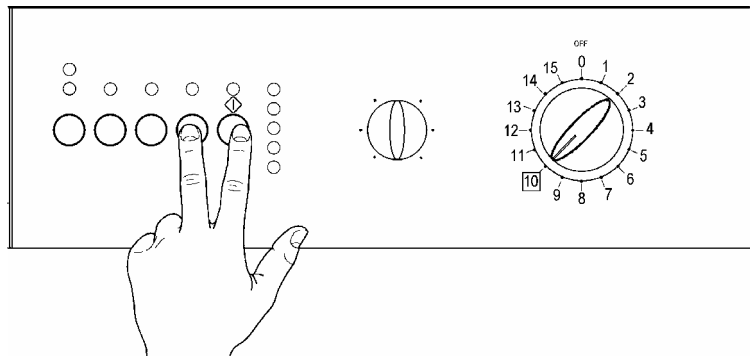
The last alarm code can be displayed even if the programme selector is not in the tenth position (diagnostics) or if the appliance is in normal operating mode (e.g. during the execution of the washing programme):

- Press and hold down **START/PAUSE** and **any of the option buttons** for at least two seconds: the LEDs initially switch off, and then display the flashing sequence corresponding to the alarm.
- The alarm sequence continues as long as the two buttons are held down.
- The alarm reading system is as described in paragraph 8.2.1.
- While the alarms are displayed, the appliance continues to perform the cycle or, if in the programme selection phase, maintains the previously-selected options in memory.

### 8.4 Cancelling the last alarm

It is good practice to cancel the last alarm:

- after reading the alarm code, to check whether the alarm re-occurs during diagnostics
- after repairing the appliance, to check whether it re-occurs during testing.



1. Select diagnostics mode and turn the programme selector to the **tenth** position (reading of alarms).
2. Press and hold down **START/PAUSE** and **any of the option buttons** at the same time.
3. Hold down the **START/PAUSE** and option buttons until the LEDs begin to flash (at least 2 seconds).

**Important:** The **START/PAUSE** button is configurable depending on the styling of the model, and is not necessarily in the position shown in the figure.



**Table of alarm codes**

<b>Alarm</b>	<b>Description</b>	<b>Possible fault</b>	<b>Action/machine status</b>	<b>Reset</b>
<b>E11</b>	<b>Difficulties in water fill for washing</b>	Tap closed or mains pressure insufficient; drain hose incorrectly positioned; water fill solenoid faulty; leaks from the hydraulic circuit of the pressure switch; pressure switch faulty; wiring faulty; PCB faulty.	Cycle paused	Start
<b>E13</b>	<b>Water leakage</b>	Drain hose incorrectly positioned; mains pressure insufficient; water fill solenoid faulty; leakage/blockage of pressure switch hydraulic circuit; pressure switch faulty.	Cycle paused	Start
<b>E21</b>	<b>Difficulties in draining</b>	Drain hose kinked/blocked/incorrectly positioned; drain filter blocked/dirty; drain pump faulty; wiring faulty; PCB faulty; current leakage from heating element to ground.	Cycle paused	Start
<b>E23</b>	<b>Drain pump triac faulty</b>	Drain pump faulty; wiring faulty; PCB faulty.	Safety drain cycle – Cycle stopped with door open	OFF
<b>E24</b>	<b>Fault in “sensing” circuit of drain pump triac</b>	PCB faulty.	Safety drain cycle – Cycle stopped with door released	OFF
<b>E33</b>	<b>Incongruence between closure of anti-boiling and 1st level pressure switch contacts</b>	Pressure switch faulty; current leakage from heating element to ground; heating element; wiring faulty; PCB faulty.	Safety drain cycle – Cycle stopped with door open	OFF
<b>E35</b>	<b>Water overflow (flooding)</b>	Water fill solenoid faulty; leakage from pressure switch hydraulic circuit; pressure switch faulty; wiring faulty; PCB faulty.	Cycle blocked. Safety drain cycle. Drain pump always in operation (5 minutes on, 5 minutes off etc.)	OFF
<b>E36</b>	<b>Fault in “sensing” circuit of anti-boiling pressure switch</b>	PCB faulty.	Cycle blocked, door locked.	OFF
<b>E37</b>	<b>1st level sensing circuit faulty</b>	PCB faulty.	Cycle blocked, door locked.	OFF
<b>E39</b>	<b>“HV” sensor of anti-overflow level faulty</b>	PCB faulty.	Cycle blocked, door locked.	OFF
<b>E41</b>	<b>Door open</b>	Door interlock faulty; wiring faulty; PCB faulty.	Cycle paused	Start
<b>E42</b>	<b>Problems of door closure</b>	Door interlock faulty; wiring faulty; PCB faulty.	Cycle paused	Start
<b>E43</b>	<b>Interlock power supply triac faulty</b>	Door interlock faulty; wiring faulty; PCB faulty.	(Safety drain cycle) Cycle blocked	OFF
<b>E44</b>	<b>Door interlock sensor faulty</b>	PCB faulty.	(Safety drain cycle) Cycle blocked	OFF
<b>E45</b>	<b>Door interlock sensing circuit triac faulty</b>	PCB faulty	(Safety drain cycle) Cycle blocked	OFF
<b>E51</b>	<b>Motor power supply triac short-circuited</b>	PCB faulty; current leakage from motor or from wiring.	Cycle blocked, door locked (after 5 attempts)	OFF
<b>E52</b>	<b>No signal from motor tachometric generator</b>	Motor faulty; wiring faulty; PCB faulty	Cycle blocked, door locked (after 5 attempts)	OFF
<b>E53</b>	<b>Motor triac sensing circuit faulty</b>	PCB faulty.	Cycle blocked, door locked	OFF
<b>E54</b>	<b>Motor relay contacts sticking</b>	PCB faulty; current leakage from motor or from wiring	Cycle blocked, door locked (after 5 attempts)	OFF

<b>Alarm</b>	<b>Description</b>	<b>Possible fault</b>	<b>Action/machine status</b>	<b>Reset</b>
<b>E61</b>	<b>Insufficient heating during washing</b>	NTC sensor faulty; heating element faulty; wiring faulty; PCB faulty.	The heating phase is skipped	---
<b>E62</b>	<b>Overheating during washing</b>	NTC sensor faulty; heating element faulty; wiring faulty; PCB faulty.	Safety drain cycle – Cycle stopped with door open	OFF
<b>E66</b>	<b>Heating element power relay faulty</b>	PCB faulty; current leakage from heating element to ground.	Safety drain cycle – Cycle stopped with door open	OFF
<b>E71</b>	<b>Washing NTC sensor faulty</b>	NTC sensor faulty; wiring faulty; PCB faulty.	The heating phase is skipped	Start
<b>E82</b>	<b>Error in selector reset position</b>	PCB faulty.	---	OFF
<b>E83</b>	<b>Error in reading selector</b>	Incorrect configuration data; PCB faulty.	Cycle cancelled	---
<b>E93</b>	<b>Incorrect configuration of appliance</b>	Incorrect configuration data; PCB faulty.	Cycle interrupted	OFF
<b>E94</b>	<b>Incorrect configuration of washing cycle</b>	Incorrect configuration data; PCB faulty.	Cycle interrupted	OFF
<b>E95</b>	<b>Communications error between microprocessor and EEPROM</b>	PCB faulty.	Cycle interrupted	OFF
<b>E96</b>	<b>Incongruency between hardware version and configuration</b>	Incorrect configuration data; PCB faulty.	Cycle interrupted	OFF
<b>E97</b>	<b>Incongruency between selector and cycles configuration</b>	Incorrect configuration data; PCB faulty.	Cycle interrupted	OFF
<b>EB1</b>	<b>Frequency of appliance incorrect</b>	Power supply problems (incorrect / disturbance); PCB faulty.	Cycle interrupted	---
<b>EB2</b>	<b>Voltage too high</b>	Power supply problems (incorrect / disturbance); PCB faulty.	Cycle interrupted	---
<b>EB3</b>	<b>Voltage too low</b>	Power supply problems (incorrect / disturbance); PCB faulty.	Cycle interrupted	---



## Key to circuit diagram

Components in the appliance	Components of the PCB
1. Electronic board	DOOR_TY Interlock triac
2. Suppressor	DRAIN_TY Drain pump triac
3. Door interlock	K1 Heating element relay
4. 1st level pressure switch	K2 Motor relay (clockwise rotation)
5. Anti-boiling pressure switch	K3 Motor relay (counter-clockwise rotation)
6. Anti-overflow pressure switch (not all models)	K4 Motor relay: half-range power (not all models)
7. Heating element	MOTOR_TY Motor triac
8. Stator (motor)	ON/OFF Main switch (on programme selector)
9. Thermal overload cut-out (motor)	PWELW_TY Pre-wash solenoid triac
10. Tachometric generator (motor)	Serial interface Asynchronous serial interface
11. Rotor (motor)	WELV_TY Wash solenoid triac
12. Drain pump	
13. Pre-wash solenoid valve	
14. Wash solenoid valve	
15. NTC temperature sensor	
16. "Door locked" pilot lamp (not all models)	